Frühe Förderung in belasteten Familien: Evaluation des Hausbesuchsprogramms *PAT – Mit Eltern Lernen* mit Fokus auf mütterliche Sensitivität und sprachliche Entwicklung

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Zusammenfassung

Die vorliegende Dissertation hat zum Ziel, frühe Förderung mit dem Hausbesuchsprogramm *PAT – Mit Eltern Lernen* in belasteten Familien zu untersuchen. Dazu wurden im Rahmen der längsschnittlich angelegten und randomisiert kontrollierten (RCT) Interventionsstudie ZEPPELIN Fragestellungen mit Fokus auf die Erreichbarkeit der Familien, Auswirkungen von Belastungen sowie Wirkungen der frühen Förderung untersucht.

Die Ergebnisse zeigen, dass die Zielgruppe rund um die Geburt erreicht und bis zum Programmabschluss im Alter von drei Jahren in der Stichprobe gehalten werden konnte. Weiter geht aus den Analysen hervor, dass neben der Gesamtbelastung insbesondere die soziale Belastung sowie die Kombination von materieller mit personal-familialer Belastung einen negativen Einfluss auf Interaktionsmerkmale wie die mütterliche Sensitivität ausüben. Hinsichtlich Wirkungen wurde deutlich, dass sich PAT mit kleinen Effekten auf die mütterliche Sensitivität und die Entwicklung der expressiven Sprache auswirkt und dass der Effekt auf die expressive Sprache partiell über die Sensitivität vermittelt wird – wobei die Effekte bei stärker belasteten Familien grösser sind. Die Ergebnisse spiegeln die Befundlage, wonach bei PAT kleine Effekte dominieren und höher belastete Familien stärker und umfassender profitieren. Weiter gibt es Hinweise darauf, dass PAT bei programmgetreuer Umsetzung sowie in Kombination mit direkter Förderung des Kindes die stärksten Effekte zeigt.

Abstract

This dissertation investigates early education with the home visiting program *PAT – Parents as Teachers* in at-risk families with children from birth over the first three years of life. Within the framework of the longitudinal and randomized controlled trial ZEPPELIN, the recognition and recruitment of the families, consequences of psychosocial burdens, and effects of early education were examined.

The results show that the recruitment of the target group and their retention until the end of the program was successful. Furthermore, the results indicate that global burden and in particular social burden as well as the combination of material-financial with personal-familial burdens have a negative impact on maternal sensitivity. Regarding program effectiveness it could be shown that PAT has a small impact on maternal sensitivity and expressive language development. This effect on expressive language is partially mediated by maternal sensitivity. Moderation and moderated mediation analyses indicate that the effects of PAT increase with the level of burdens. The results confirm previous findings: families with higher burdens benefit more from the PAT program and PAT in general produces small effects. Moreover, PAT shows the highest effects when combined with direct education of the child and when the program is strictly implemented in accordance with the program's manual.

Inhaltsverzeichnis

Dank

Die vorliegende Dissertation entstand im Rahmen des Projekts ZEPPELIN der Interkantonalen Hochschule für Heilpädagogik Zürich (HfH). Mit ihrer Fertigstellung blicke ich auf rund fünf Jahre intensive Forschungstätigkeit zurück, die verschiedene Personen durch Ihre Mitwirkung, Unterstützung und Geduld ermöglicht haben. An dieser Stelle möchte ich ihnen gerne meinen herzlichen Dank aussprechen:

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Alex Neuhauser

Zusammenfassung

Zahlreiche Untersuchungen belegen, dass im deutschsprachigen Raum der Bildungserfolg mit der sozialen Herkunft zusammenhängt. Bereits beim Eintritt in den Kindergarten sind Kompetenzunterschiede nach sozioökonomischem Status nachweisbar, die während der Schulzeit nicht kompensiert werden können. Vor diesem Hintergrund hat sich zum Abbau von herkunftsbedingten Bildungsungleichheiten das Interesse an frühkindlicher Bildung, Betreuung und Erziehung (FBBE) erhöht. Neben der direkten Förderung der Kinder in familienergänzenden Einrichtungen sollen zunehmend die Eltern in ihren Erziehungs- und Beziehungskompetenzen gestärkt werden, um so indirekt die Kinder in ihrer Entwicklung zu unterstützen. Solche Angebote indirekter Förderung richten sich vor allem an Familien, die verschiedenen Risiken für die kindliche Entwicklung wie Armut, schwierigen familialen Verhältnissen oder sozialer Isolation ausgesetzt sind und daher als belastet gelten. Es ist aber weitgehend unklar, ob und über welche Wege sich diese Zielgruppe erreichen lässt und inwiefern die Angebote in der Schweiz wirksam sind – aus dem deutschsprachigen Raum liegen bislang nur wenige Interventionsstudien vor. Daher hat die vorliegende Dissertation zum Ziel, frühe Förderung mit dem Hausbesuchsprogramm *PAT – Mit Eltern Lernen (PAT)* zwischen Geburt und drittem Lebensjahr bei belasteten Familien zu untersuchen.

Die Dissertation umfasst vier Studien, die sich jeweils mit spezifischen Fragestellungen zur frühen Förderung befassen: *Studie 1* untersucht mittels systematischem Review den Forschungsstand zur Wirksamkeit von PAT in belasteten Familien unter Berücksichtigung von Merkmalen der Struktur- und Prozessqualität. Die Studien 2 bis 4 analysieren Daten aus dem ZEPPELIN 0-3 Projekt, einer längsschnittlich angelegten Interventionsstudie, welche die Wirksamkeit von PAT an drei Projektstandorten im Kanton Zürich (Schweiz) mittels randomisiert kontrollierter Versuchsanordnung (RCT) evaluiert. Dabei widmet sich *Studie 2* der Frage, inwiefern belastete Familien erreicht und mittels Randomisierung ausgewogen auf die Interventions- und Kontrollgruppe verteilt werden können. *Studie 3* untersucht, wie sich verschiedene Formen der Belastung einzeln oder in Kombination auf die mütterliche Sensitivität auswirken. *Studie 4* analysiert schliesslich, inwiefern Effekte von PAT auf die Sprachentwicklung über die mütterliche Sensitivität vermittelt und durch das Ausmass der Belastung moderiert werden.

Die Ergebnisse zur *Erreichbarkeit* belasteter Familien zeigen, dass die Zielgruppe rund um die Geburt zur Projektteilnahme erreicht, ausgewogen auf die Interventions- und Kontrollgruppe verteilt und bis zum Programmabschluss in der Stichprobe gehalten werden konnte. Weiter geht aus den Analysen zu den *Belastungen* hervor, dass sich neben der Gesamtbelastung insbesondere die soziale Belastung sowie die Kombination von materieller mit personal-familialer Belastung negativ auf die mütterliche Sensitivität auswirken. Demgegenüber hat ein höherer Bildungsstand einen positiven Einfluss auf die mütterliche Sensitivität. Hinsichtlich *Wirksamkeit* ist die Befundlage zu PAT heterogen: Gemäss systematischem Review sind die Effekte mehrheitlich klein, vereinzelt substanziell und nur selten signifikant. Weiter gibt es Hinweise darauf, dass höher belastete Familien um-

fassender profitieren und dass PAT bei programmgetreuer Umsetzung sowie in Kombination mit direkter Förderung des Kindes die stärksten Effekte zeigt. Die Ergebnisse aus den eigenen Untersuchungen fügen sich in dieses Bild ein: Es wurden kleine Effekte auf die mütterliche Sensitivität im Alter von 12 Monaten und die Sprachentwicklung im Alter von 36 Monaten nachgewiesen, wobei die Effekte bei den stärker belasteten Familien höher waren. Die Analyse der *Wirkmechanismen* ergibt, dass Interventionseffekte auf die Sprachentwicklung über die mütterliche Sensitivität vermittelt werden, allerdings in schwacher Ausprägung und über spezifische Pfade.

Insgesamt verweisen die Studien sowohl auf die ungünstigen Auswirkungen von Belastungen als auch auf das Potenzial früher Förderung mit PAT bei belasteten Familien. Vielversprechend scheint demzufolge eine Förderstrategie zu sein, die eine gezielte Reduktion von Belastungen und die Stärkung der elterlichen Sensitivität in sich vereint und mit Massnahmen zur direkten Förderung der Kinder kombiniert.

Abkürzungen

AJB	Amt für Jugend und Berufsberatung Kanton Zürich
CARE-Index	Child-Adult Relational Experimental Index
CI	Confidence Interval
CFI	Comparative Fit Index
CG	Control Group
ECCE	Early Childhood Care and Education
ECEC	Early Childhood Education and Care
FBBE	Frühe Bildung, Betreuung und Erziehung
GM	Group Meeting
HBS	Heidelberger Belastungsskala
HfH	Hochschule für Heilpädagogik Zürich
HomVEE	Home Visiting Evidence of Effectiveness
HV	Home Visit
IG	Intervention Group
ICC	Intraclass Correlation
ISEI	International Socio-Economic Index of Occupational Status
LCA	Latent Class Analysis
MAR	Missing at Random
MVB	Mütter- und Väterberatungsstellen
NICHD	National Institute of Child Health and Human Development
NFP	Nurse-Family Partnership Program
NZFH	Nationales Zentrum Frühe Hilfen
OECD	Organisation for Economic Co-operation and Development
PAT	Parents as Teachers
PISA	Programme for International Student Assessment
QES	Quasi Experimental Study
RCT	Randomized Controlled Trial
RMSEA	Root Mean Square Error of Approximation
SES	Socioeconomic Status
SRMR	Standardized Root Mean Square Residual
TLI	Tucker-Lewis-Index
UNESCO	United Nations Educational, Scientific and Cultural Organization
WWC	What Works Clearinghouse
ZEPPELIN	Zürcher Equity Präventions Projekt Elternbeteiligung und Integration

Liste der Originalpublikationen

Studie 1:
Neuhauser, A. (2014). A closer look at the effectiveness of early childhood education in at-risk families. *Mental Health & Prevention*, *2*(3-4), 43–57. doi.org/10.1016/j.mhp.2014.09.002

Studie 2:
Neuhauser, A., Ramseier, E., Schaub, S., Burkhardt, S. C. A., Templer, F., & Lanfranchi, A. (2015). Hard to reach families – A methodological approach to early recognition, recruitment, and randomization in an intervention study. *Mental Health & Prevention*, *3*(3), 79–88. doi.org/10.1016/j.mhp .2015.07.002

Studie 3:
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Studie 4:
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Synopse

Frühe Förderung in belasteten Familien: Evaluation des Hausbesuchsprogramms *PAT – Mit Eltern Lernen* mit Fokus auf mütterliche Sensitivität und sprachliche Entwicklung

1. Einleitung

Seit der Jahrtausendwende ist die frühkindliche Förderung zunehmend Gegenstand von bildungspolitischen und wissenschaftlichen Diskussionen. Die Resultate der international vergleichenden Schulleistungsstudien, insbesondere PISA (Baumert & Schümer, 2001; OECD, 2004, OECD, 2010, OECD, 2013; Ramseier & Brühwiler, 2003), haben erneut den engen Zusammenhang zwischen Merkmalen der sozialen Herkunft und dem Bildungserfolg vor Augen geführt. Weitere Untersuchungen belegen, dass herkunftsbedingte Bildungsdisparitäten bereits beim Eintritt in den Kindergarten bestehen und während der Kindergarten- und Schulzeit nicht kompensiert werden können (Angelone & Ramseier, 2012; Moser, Bayer, & Berweger, 2008; Rabe-Kleber, 2011). Vor diesem Hintergrund ist das Interesse an den Potenzialen früher Förderung erheblich gestiegen. Von einem qualitativen und quantitativen Ausbau institutionalisierter frühkindlicher Bildung, Betreuung und Erziehung werden bessere Bildungschancen erwartet – insbesondere für Kinder aus benachteiligten familiären Verhältnissen (Edelmann, 2015; Lanfranchi, 2016; Ziegenhain, 2008).

Somit rückt ein präventiver Gedanke in den Vordergrund: Die Unterstützung erfolgt nicht erst bei manifesten Problemen, sondern dient dazu, potentielle Problementwicklungen zu vermeiden (Lanfranchi, 2014; Roos, 2012). Zielgruppe sind daher Familien, die Risiken für die kindliche Entwicklung und den Schulerfolg – wie Armut, soziale Isolation oder schwierige familiale Verhältnisse – aufweisen und daher als belastet gelten. Ein Problem der Präventionsarbeit besteht im Dilemma, dass gerade die Familien mit (aus gesellschaftlich-normativer Sicht) besonders grossem Bedarf nach Unterstützung und Begleitung von den Angeboten im Bildungs- und Beratungsbereich oft nicht erreicht werden (Barnes, MacPherson, & Senior, 2006; Bauer, 2005; Heinrichs, Bertram, Kuschel, & Hahlweg, 2005). Erschwerend kommt hinzu, dass sich Angebote der selektiven Prävention an Kinder richten, die ihrerseits (noch) nicht auffällig geworden sind und infolgedessen für die Eltern kein unmittelbarer Handlungsbedarf besteht – auch wenn Risiken im Umfeld des Kindes vorhanden sind. Die grösste Herausforderung ist deshalb, einen Zugang zu diesen Familien zu finden und sie für die Teilnahme an effektiven Angeboten früher Förderung zu gewinnen.

Einen niederschwelligen Zugang zu früher Förderung erlauben so genannte Hausbesuchsprogramme. Ihnen ist gemeinsam, dass sie über die Entlastung und Unterstützung der Eltern zu einer besseren Situation für das Kind führen sollen. Im Hinblick auf Lernen und Schulvorbereitung hat sich das US-amerikanische Programm *PAT – Mit Eltern Lernen (PAT)* etabliert. Es hat zum Ziel,

über die Stärkung der Eltern-Kind-Interaktion die Entwicklung zu fördern und das Kind gut auf die Schule vorzubereiten (Parents as Teachers National Center, 2011). Im deutschsprachigen Raum besteht mit entsprechenden Programmen bislang nur wenig Erfahrung, insbesondere wurde ihre Wirksamkeit selten wissenschaftlich überprüft (Cierpka, Stasch, & Groß, 2007; Stamm et al., 2009). Deshalb ist weitgehend unklar, ob und über welche Wege sich belastete Familien erreichen lassen und inwiefern die frühe Förderung wirksam ist. Zwar liegen aus anderen Ländern und insbesondere aus dem angelsächsischen Raum zahlreiche Interventionsstudien vor (für einen Überblick vgl. Mathematica Policy Research, 2016), ihre Übertragbarkeit auf die Schweiz ist aber angesichts unterschiedlicher sozialer Verhältnisse sowie anderer gesundheitlicher und psychosozialer Versorgungssysteme fraglich (Benz & Sidor, 2013).

Vor diesem Hintergrund hat die vorliegende Dissertation zum Ziel, frühe Förderung mit dem Hausbesuchsprogramm PAT bei *belasteten* Familien zu untersuchen. Besondere Beachtung wird dabei der Erreichbarkeit der Familien, den Belastungskonstellationen sowie der Wirksamkeit von PAT geschenkt. Als Ergebnisvariablen stehen auf Ebene Eltern die Sensitivität und auf Ebene Kind die Sprachentwicklung im Vordergrund. Erstere gilt als zentraler Ansatzpunkt familienzentrierter früher Förderung (Gloger-Tippelt, 2010; Ziegenhain, 2008), letztere spielt eine wichtige Rolle für den späteren Schulerfolg der Kinder (Kammermeyer & Roux, 2013).

Die Dissertation beinhaltet vier Studien, die sich jeweils mit spezifischen Fragen zur frühen Förderung beschäftigen: Bei der *ersten Studie* handelt es sich um ein systematisches Review zur Wirksamkeit von PAT bei belasteten Familien unter Berücksichtigung von Merkmalen der Struktur- und Prozessqualität, wie z.B. Breite des Förderangebots bzw. Intensität der Durchführung. Die *zweite Studie* knüpft an das Präventionsdilemma an. Sie beschreibt die Methoden der Früherkennung und des Zugangs zu den Familien und überprüft, inwiefern damit die Gruppe der belasteten Familien erreicht werden kann. Die *dritte Studie* widmet sich den Belastungskonstellationen. Sie untersucht, wie sich verschiedene Formen der Belastung sowie ihre Kombination auf die mütterliche Sensitivität auswirken. Und schliesslich wird in *Studie 4* analysiert, inwiefern Effekte von PAT auf die Sprachentwicklung über die mütterliche Sensitivität vermittelt und durch das Ausmass der Belastung moderiert werden.

Die vorliegende Synopse gliedert sich in drei Teile: Im einleitenden Teil werden die Entwicklungslinien früher Förderungen beschrieben, zentrale Konzepte geklärt sowie die zu bearbeitenden Fragestellungen hergeleitet und begründet. Darauf folgt ein empirischer Teil mit der Zusammenfassung der einzelnen Beiträge. Abschliessend werden die einzelnen Studien diskutiert sowie Folgerungen für Forschung und Programmentwicklung gezogen.

1.1 Entwicklungslinien in der frühen Förderung

Die Erwartung, mit frühkindlicher Förderung zu einem Abbau von herkunftsbedingten Ungleichheiten beizutragen, ist nicht neu. Breit angelegte Förderprogramme zum Ausgleich von herkunftsbedingten Bildungsbenachteiligungen wurden erstmals in den USA in den 1960er Jahren durchgeführt. Ausgehend von der nach dem 2. Weltkrieg weit verbreiteten Armut, dem Sputnik-Schock (1957) sowie den Forderungen von Bürgerrechtsbewegungen wuchs das politische Interesse an Massnahmen, die herkunftsbedingte Benachteiligungen von Kindern kompensieren sollten (Astuto & LaRue, 2009; Fatke, 1972; Schmidt & Smidt, 2014). Im Zuge dieser Bildungsreformen wurden kompensatorisch ausgerichtete Vorschulprogramme eingeführt und evaluiert, wie beispielsweise das bis heute landesweit implementierte *Head Start* (vgl. für einen Überblick Bronfenbrenner, 1974). Neben diesen Ansätzen der direkten Förderung wurden auch Hausbesuchsprogramme entwickelt, mit dem Ziel, über die Entlastung und Unterstützung der Eltern die Situation für das Kind zu verbessern. Diese Programme fanden aber erst ab den 1980er Jahren Verbreitung – insbesondere dank den positiven und lang anhaltenden Effekten des *Nurse Family Partnership Program* (Astuto & LaRue, 2009; Gomby, 2005).

Mit einigen Jahren Verzögerung erreichte die kompensatorische Erziehung Ende der 1960er Jahre auch den deutschsprachigen Raum. Die Interessen hinter den kompensatorischen Erziehungsprogrammen waren sowohl ökonomischer als auch sozialpolitischer Art und wurden von der Forderung nach Chancengleichheit, Ausschöpfung der Begabungsreserven und Bildung als Bürgerrecht getragen. Im Zuge der damit einhergehenden Bildungsreformen wurden Vorschulklassen eingerichtet und Kindergartenplätze ausgebaut. In diesem Rahmen entstanden auch erste Studien zur Entwicklung und Evaluation von Förderprogrammen mit Fokus auf Einschulungsalter, Frühlesen, Sprache und Intelligenz (Anders & Rossbach, 2013; Schmidt & Smidt, 2014). Schon bald sahen sich die Vorschulprogramme zur kompensatorischen Erziehung jedoch mit Kritik konfrontiert. Bemängelt wurde die einseitig kognitive Ausrichtung der Trainingsprogramme, die unkritische Ausrichtung an Schul- und Mittelschichtnormen, die Defizitorientierung der kompensatorischen Massnahmen, die Gefahr der Stigmatisierung ganzer Bevölkerungsgruppen sowie die Vernachlässigung schulstruktureller Merkmale (Schmidt & Smidt, 2014). Hinzu kam, dass die Ergebnisse aus den Wirksamkeitsuntersuchungen heterogen ausfielen und kontrovers diskutiert wurden – so zum Beispiel im Hinblick auf das *Head Start* Programm (Bronfenbrenner, 1974). Diese Entwicklungen dürften dazu beigetragen haben, dass die Diskussion um kompensatorische Erziehung im Zuge der 1970er Jahre insbesondere im deutschsprachigen Raum an Aufmerksamkeit verlor – noch bevor Hausbesuchsprogramme in den USA landesweit implementiert wurden (Anders & Rossbach, 2013; Astuto & LaRue, 2009; Schmidt & Smidt, 2014).

Dieser Zustand wurde erst durch den so genannten „PISA-Schock“ (Gudjons & Traub, 2016, S. 85) bzw. dessen Folgen beendet. Anknüpfend an gesellschaftlichen Wandel und verändertem Bedarf an familienergänzender Betreuung geriet die frühe Förderung zum Abbau von herkunftsbe-

dingten Bildungsungleichheiten erneut ins Blickfeld der bildungspolitischen und wissenschaftlichen Aufmerksamkeit. In der Konsequenz investierten zahlreiche OECD-Länder in den qualitativen und quantitativen Ausbau ihrer frühpädagogischen Angebote – unter anderem auch Deutschland und die Schweiz (Anders & Rossbach, 2013; Edelmann, Brandenberg, & Mayr, 2013; Leseman, 2009). Im Mittelpunkt der Diskussion stand zunächst eine bessere Schulvorbereitung durch die familienergänzenden Einrichtungen, wobei die alltagsintegrierte Sprachförderung einen hohen Stellenwert einnahm (Kammermeyer & Roux, 2013; Schulte-Haller, 2009). Erst in den letzten Jahren hat sich das Interesse an aufsuchender Eltern- und Familienbildung und damit auch an der Wirksamkeit von Hausbesuchsprogrammen verstärkt (Stamm, 2010).

1.2 Förderliche Bedingungen und Risiken in der frühkindlichen Entwicklung

Die aktuellen Argumentationslinien früher Prävention stützen sich hauptsächlich auf neurobiologische und entwicklungspsychologische Erkenntnisse, wonach in der frühen Kindheit ein wichtiger Grundstein für den Bildungserfolg gelegt wird und Versäumnisse nur mit ungleich höherem Aufwand zu kompensieren sind (Edelmann et al., 2013; Roos, 2012; Stamm, 2010). Die frühe Kindheit gilt somit als bedeutsame und zugleich kritische Phase im Leben eines Menschen. Zu keiner anderen Zeit wächst das Kind schneller, lernt es mehr neue Dinge und durchläuft das Gehirn grössere Veränderungsprozesse (Pauen, Frey, & Ganser, 2012). Deshalb kommt der Frage nach förderlichen Umweltbedingungen in der frühen Kindheit ein besonderes Gewicht zu. Aus der Bindungsforschung ist bekannt, dass sensitives Interaktionsverhalten ein wichtiger Prädiktor für die kindliche Entwicklung ist (z.B. Hirsh-Pasek & Burchinal, 2006; Zimmermann et al., 2013). Im Hinblick auf den Schulerfolg haben sich die sprachlichen Kompetenzen als bedeutsam erwiesen (Kammermeyer & Roux, 2013).

1.2.1 Elterliche Sensitivität und Sprachentwicklung

In der modernen Entwicklungspsychologie wird unter Entwicklung ein transaktionaler und dynamischer Prozess verstanden, der sich in der *Interaktion* eines Individuums mit seiner sozialen und gegenständlichen Umwelt vollzieht (Bronfenbrenner & Morris, 2006; Sameroff, Bartko, Baldwin, Baldwin, & Seifer, 2009). In diesem Verständnis gestalten bereits Säuglinge die Interaktionen mit ihrer Umwelt aktiv mit. Sie sind mit erstaunlichen, für ihre Entwicklung notwendigen kommunikativen Kompetenzen ausgestattet, wie z.B. mit der Fähigkeit, die komplementären Verhaltensweisen bei der erwachsenen Bezugsperson zu wecken und zu nutzen. Obwohl dieses Verhaltensrepertoire beim Neugeborenen noch gering ausgebildet ist, gelingen ihm – unterstützt durch die erwachsene Bezugsperson – schon kurze Phasen des aufmerksamen Schauens und Lauschens (Pauen et al., 2012; Rauh, 2002). Solche Austauschprozesse werden in den ersten Lebensjahren entscheidend von sozial-emotionalen Regulationsprozessen dominiert. Sozial-emotionale Kompetenzen, wie Frustrati-

onstoleranz, Ausdauer oder die Fähigkeit Bedürfnisse aufzuschieben, spielen für den flexiblen Umgang mit neuen Situationen und die Interaktion mit der Umwelt eine zentrale Rolle (Ziegenhain, 2008).

Aus bindungstheoretischer Sicht tragen *sensitive Interaktionen* zu sicherer Bindung und damit unter anderem auch zur Entwicklung der Selbstregulation bei. Unter Sensitivität wird die Fähigkeit verstanden, die Signale des Kindes wahrzunehmen, zu interpretieren und prompt und angemessen darauf zu reagieren (Ainsworth, Blehar, Waters, & Wall, 1978). Aus transaktionaler Perspektive ist zu beachten, dass sich Bezugsperson und Kind gegenseitig beeinflussen und Sensitivität daher als eine dynamische Eigenschaft zu verstehen ist, die sich erst in Interaktionssituationen herausbildet und sich mit dem Kind über die Zeit weiterentwickelt (Simó, Rauh, & Ziegenhain, 2000). Macht das Kind die Erfahrung, dass ihm die Bezugsperson den nötigen Schutz und die erwünschte Nähe gewährt, so trägt das zum Aufbau einer sicheren Bindung bei. Sicher gebundene Kinder sind in der Lage, ihre emotionalen Bedürfnisse nach Nähe und Exploration situationsangemessen zu regulieren und zu befriedigen. Diese regulatorischen Kompetenzen helfen dem Kind, neugierig und interessiert mit seiner sozialen und gegenständlichen Umwelt in Kontakt zu treten (Ziegenhain, 2008). So zeigen Säuglinge sensitiver Mütter im ersten Lebensjahr eine ausgewogene Balance zwischen selbständigem Spiel und Freude am Kontakt mit ihrer Mutter. Sie haben Vertrauen in ihre Verfügbarkeit und benutzen sie als sichere Basis, von der aus sie ihre Umwelt explorieren (Grossmann et al., 2003). Elterliche Sensitivität gilt daher generell als wichtiger Prädiktor für kindliche Entwicklungsverläufe, was sich mit zahlreichen Studien für verschiedene Entwicklungsbereiche belegen lässt (DeWolff & Ijzendoorn, 1997; Hirsh-Pasek & Burchinal, 2006; Landry, Smith, & Swank, 2006; Raby, Roisman, Fraley, & Simpson, 2015; Zwönitzer et al., 2015). Im Hinblick auf die *sprachliche Entwicklung* haben sich verschiedene Aspekte der Sensitivität als förderlich erwiesen. So unterstützen prompte und kontingente Antworten auf kommunikative und explorative Handlungen die Entwicklung der Pragmatik, also das Verständnis, dass Sprache dem Mitteilen von Absichten dient und einen sozialen Sinn hat. Dieses Verständnis ist wiederum Grundlage für die Entwicklung der Semantik – dem Lernen von Wortbedeutungen. Letztere wird durch verschiedene Aspekte der Sensitivität unterstützt, wie zeitliche Kontiguität, Kontingenz, Multimodalität oder die Abstimmung auf die Fähigkeiten des Kindes (Tamis-LeMonda, Kuchirko, & Song, 2014).

1.2.2 Risikokonstellationen

Die Qualität der Eltern-Kind-Interaktion gilt als einer der besten Prädiktoren für kindliche Entwicklungsverläufe – sowohl im positiven wie auch im negativen Sinn: Vermitteln die Interaktionen dem Kind emotionale Sicherheit und adäquate Anregung, wie es bei elterlicher Sensitivität der Fall ist, dann ist von förderlichen Bedingungen auszugehen. Umgekehrt sind Bedingungen mit wenig Anregung und wenig emotionaler Sicherheit als Risiken zu bezeichnen, weil sie die Wahrscheinlichkeit für das Auftreten von Entwicklungsauffälligkeiten erhöhen (Heilig, 2014; Laucht, Esser, & Schmidt,

2000). Im Extremfall zeigt sich dies in der Abwesenheit adäquater und in der Präsenz bedrohlicher Kontextbedingungen im Sinne von Vernachlässigung und Misshandlung. Zahlreiche Studien belegen, dass sich beides negativ auf die frühkindliche Gehirnentwicklung sowie auf kognitive, psychosoziale, gesundheitliche und verhaltensbezogene Merkmale auswirkt (Institute of Medicine and National Research Council, 2014). Der starke Einfluss der Eltern-Kind-Interaktion liegt darin begründet, dass sie den unmittelbaren Erfahrungskontext des Kindes umfasst. Gleichzeitig ist sie der wichtigste Mediator zwischen kindlichen Entwicklungsverläufen und einer Vielzahl assoziierter biologischer und psychosozialer Risiken, wie beispielsweise dem kindlichen Temperament, psychischer Erkrankung eines Elternteils oder dem sozioökonomischem Status (Heilig, 2014).

Risikofaktoren entfalten ihre Wirkungen in der Regel nicht alleine durch ihr frühes Auftreten, sondern durch langanhaltende zeitliche Stabilität in ihrer beeinträchtigenden Wirkung. Dies ist insbesondere in so genannten Risikokonstellationen der Fall, in denen sich verschiedene Risiken kumulieren ohne durch Schutzfaktoren abgefedert zu werden (Heilig, 2014; Sabates & Dex, 2015; Scheithauer & Petermann, 1999). Schutzfaktoren, wie z.B. freundliches Temperament, ausgeprägte kognitive Kompetenzen des Kindes oder gelungene Eltern-Kind-Interaktionen, moderieren die Wirkungen vorhandener Risikofaktoren und senken so die Wahrscheinlichkeit des Auftretens von Entwicklungsauffälligkeiten (Egle & Hardt, 2014; Heilig, 2014; Scheithauer & Petermann, 1999). Die Wirkungen von Risiken sind folglich als das Ergebnis eines komplexen Zusammenspiels zwischen vielfältigen Risiko- und Schutzfaktoren zu verstehen, wobei die genauen kausalen Abfolgen noch nicht geklärt sind (Laucht et al., 2000; Sabates & Dex, 2015). Im wissenschaftlichen Sprachgebrauch wird synonym für den Begriff *Risiko* oft der Begriff *Belastung* verwendet (Belsky, 2014; Egle & Hardt, 2014), manchmal als Begriffskonstruktion *Risikobelastung* (Cierpka et al., 2007; Heilig, 2014; Sidor, Eickhorst, Stasch, & Cierpka, 2012).

Die Prävalenz von Risiken ist schwierig abzuschätzen, da aus dem deutschsprachigen Raum nur wenige empirisch abgesicherte Daten vorliegen. In aktuellen Befragungen aus Deutschland berichten 17% der Familien mit Kleinkindern über elternbezogene Belastungen wie Erziehungsstress, 16% über ängstlich-depressive Symptome (Eickhorst, Fullerton, & Schreier, 2017; Schreier et al., 2016). Eine Pilotstudie mit Kindern im Alter zwischen 4 und 7 Jahren fand bei 13% Anhaltspunkte für Kindesvernachlässigung oder -misshandlung (Thurn et al., 2017). Im Hinblick auf die Lebensbedingungen in der Schweiz sind gemäss SILC (Statistics on Income and Living Conditions) 16% der Kinder und Jugendlichen im Alter zwischen 0 und 17 Jahren armutsgefährdet. Verfügen beide Eltern über keine Schweizer Staatsangehörigkeit, steigt die Armutsgefährdungsquote auf 25% (BFS, 2016). Im Schweizer Bildungssystem tragen insbesondere Kinder aus ressourcenarmen Verhältnissen mit und ohne Migrationshintergrund ein hohes Risiko für Kompetenz- und Bildungsarmut (Becker, 2013). Das zeigt sich unter anderem darin, dass sie in Schultypen mit erweiterten Anforderungen unter- und in sonderpädagogischen Angeboten überproportional vertreten sind (Kronig, 2007; Moser & Lanfranchi, 2008; Sahrai, 2015). Sie laufen somit Gefahr, grundlegende Kulturtechniken nicht zu

erlernen, die in modernen Gesellschaften als Grundvoraussetzung für eine erfüllende Lebensführung und aktive Teilhabe am gesellschaftlichen Leben gelten (Brake & Büchner, 2012). Diese herkunftsbedingten Bildungsdisparitäten erweisen sich seit den 1960er Jahren als äusserst stabil – trotz Bildungsexpansion und Bildungsreformen (Becker & Zangger, 2013; Buchmann, Sacchi, Lamprecht, & Stamm, 2010; Hadjar & Berger, 2010; Jann & Combet, 2012).

1.3 Frühe Förderung

Die vorangehenden Ausführungen machen deutlich, dass ein erheblicher Teil der Kinder im deutschsprachigen Raum unter belasteten familiären Bedingungen aufwächst und dadurch schon im Vorschulalter in seinen Entwicklungs- und Bildungschancen gefährdet ist. Vor diesem Hintergrund sind Angebote in der frühen Kindheit gefragt, die so früh wie möglich die Entwicklungsbedingungen von Säuglingen und Kleinkindern verbessern.

Der Begriff *frühe Förderung* bezieht sich auf sämtliche Massnahmen zur Unterstützung der kindlichen Entwicklung im Vorschulalter (Netzwerk Kinderbetreuung, 2012). Er ist abzugrenzen vom Begriff der Frühförderung, welcher in der Schweiz ein stehender Begriff der Sonder- und Heilpädagogik ist. Oft wird synonym zur frühen Förderung die Begriffskonstruktion *Frühkindliche Bildung, Betreuung und Erziehung* (FBBE) verwendet. Diese Trias soll die enge Verzahnung zwischen den Begriffen und den dahinter stehenden Konzepten verdeutlichen (Stamm, 2010). Darüber hinaus schliesst sie an international gebräuchliche Terminologien an, wie *Early Childhood Care and Education* (ECCE) (UNESCO, 2007) oder *Early Childhood Education and Care* (ECEC) (Eurydice, 2009; OECD, 2001).

Im Feld der frühen Förderung wird zwischen Förderstrategien unterschieden, die sich direkt auf das Kind beziehen, indirekt über die Unterstützung der Eltern erfolgen oder beide Formen der Unterstützung miteinander kombinieren. Für belastete Familien haben sich Hausbesuchsprogramme (Gehstrukturen) etabliert. Sie basieren auf der Überzeugung, dass Familien mit jungen Kindern am besten zu Hause erreicht werden anstatt zu erwarten, dass sich die Eltern selber Unterstützung organisieren. Gegenüber örtlich gebundenen Angeboten (Kommstrukturen) haben sie den Vorteil, dass sich die Eltern nicht um Transport, Kinderbetreuung oder arbeitsfreie Zeit kümmern müssen. So ermöglichen sie insbesondere belasteten Familien einen niederschwelligen Zugang zu früher Förderung (Sweet & Appelbaum, 2004; Ziegenhain, 2007).

1.3.1 Hausbesuchsprogramme

Der Begriff Hausbesuch (home visitation) bezeichnet lediglich eine *Strategie* der frühen Förderung, nämlich die Unterstützung bei den Familien zu Hause. Deshalb unterscheiden sich Hausbesuchsprogramme hinsichtlich verschiedener Merkmale der Konzept-, Struktur- und Prozessqualität, wie z.B. Zielgruppe, Förderziele, theoretische Grundlagen, Inhalt des Curriculums, vorgesehene Dauer und

Intensität, Alter des Kindes beim Förderbeginn oder Qualifikation des Personals (Gomby, 2005; Heekerens, 2008; Karoly, Kilburn, & Cannon, 2005). Gemeinsam ist den meisten Hausbesuchsprogrammen, dass über die Einflussnahme auf das Elternverhalten sich die Situation für das Kind verbessern soll. In der Regel sind Hausbesuchsprogramme durch ein formales Curriculum, einen individualisierten Förderplan, sowie Besuchsprotokolle strukturiert (Gaylor & Spiker, 2012).

Die Heterogenität zwischen den verschiedenen Hausbesuchsprogrammen bildet sich auch in der Qualität der Untersuchungsdesigns und den nachgewiesenen Effektstärken ab. Insgesamt ist auf Eltern- und Kindesebene von kleinen positiven Effekten auszugehen, die in Einzelfällen auch ein moderates Ausmass erlangen können (Filene, Kaminski, Valle, & Cachat, 2013; Gomby, 2005; Gomby, Culross, & Behrman, 1999; Nievar, van Egeren, & Pollard, 2010; Sweet & Appelbaum, 2004). Längerfristige positive Effekte wurden auf Schulnoten, Inanspruchnahme sonderpädagogischer Angebote, Leistungstests und Bildungsabschlüsse nachgewiesen. Allerdings konnten die Ergebnisse in hochwertigen Studien nicht reliabel repliziert werden (Gomby, 2005). Vorbildcharakter wird in dieser Hinsicht dem *Nurse-Family Partnership Program (NFP)* für schwangere Frauen und Eltern von Säuglingen zugeschrieben. Die positiven Effekte wurden in Untersuchungen hoher Qualität für verschiedene Populationen an verschiedenen Standorten reliabel repliziert, ebenso wurden Langzeiteffekte belegt (Eckenrode et al., 2010). Der postulierte indirekte Effekt über Eltern- auf Kindesmerkmale konnte bislang nicht generell gestützt werden, da Effekte auf Elternebene nur inkonsistent mit Effekten auf Ebene des Kindes korrespondieren (Gaylor & Spiker, 2012). Metaanalysen belegen eine höhere Wirksamkeit bei stärkerer Intensität (Nievar & Becker, 2008) sowie bei der Kombination von indirekter mit direkter Förderung (Blok, Fukkink, Gebhardt, & Leseman, 2005). Letzteres wird oft mit Ergebnissen aus vielzitierten Modellprojekten belegt, die kind- mit familienzentrierten Massnahmen in ausserordentlich hoher Intensität und Qualität kombinieren und sich infolgedessen durch aussergewöhnlich starke und lang anhaltende Effekte auszeichnen. Exemplarisch zu nennen ist das *High/Scope Perry Preschool Program* (Schweinhart, 2005). In diesem Projekt wurden Kinder aus belasteten familiären Verhältnissen ab dem Alter von drei und vier Jahren bis zum Schuleintritt in Vorschulstrukturen während fünf Halbtagen die Woche direkt gefördert und die Familien einmal wöchentlich mit Hausbesuchen unterstützt.

Im deutschsprachigen Raum fanden Hausbesuchsprogramme demgegenüber weniger Verbreitung. Erst in jüngerer Zeit wurden Modellprojekte initiiert und evaluiert. Einen Überblick über den Forschungsstand der (teilweise noch nicht abgeschlossenen) Studien erlaubt die Metaanalyse von Taubner, Wolter und Rabung (2015). Darin werden die Effekte von neun Interventionen für belastete Familien mit Kindern bis zum Alter von drei Jahren untersucht, darunter auch eine Adaptation des Vorzeigeprogramms Nurse Family Partnership. Insgesamt konnten nur kleine positive Effekte auf Elternmerkmale nachgewiesen werden und dies nur unmittelbar nach Abschluss der Förderung. Die Effekte auf Merkmale der Kinder sowie die follow-up Ergebnisse waren nicht signifikant.

Einen ausführlichen Blick auf den Forschungsstand in der Schweiz erlaubt die für die UNESCO verfasste Grundlagenstudie „Frühkindliche Bildung in der Schweiz“ (Stamm et al., 2009). Die Autorinnen halten zusammenfassend fest, dass die bisherigen Evaluationsbemühungen für eine umfassende Wissensgrundlage nach wie vor ungenügend und im internationalen Vergleich bescheiden geblieben sind. Zur Wirksamkeit von Hausbesuchsprogrammen liegen zwei neuere Evaluationen des *schritt:weise* Programms vor (in Bern unter dem Namen *primano*), die beide positive Effekte berichten (Diez Grieser & Simoni, 2012; Tschumper et al., 2012), in Metaanalysen aber nicht berücksichtigt wurden.

Schliesslich sei noch auf ein generelles Desiderat der Interventionsforschung hingewiesen, nämlich dass Eltern ohne gute Deutschkenntnisse bei Forschungsprojekten oft nicht beteiligt sind – obwohl sie in besonderem Ausmass von Belastungen betroffen sind (BFS, 2016). Sie werden entweder von vornherein ausgeschlossen (Laucht, Esser, & Schmidt, 1997; Sidor, Kunz, Eickhorst, & Cierpka, 2013) oder nicht gezielt angesprochen (Maier-Pfeiffer, Kurz, Brand, Hartmann, & Jungmann, 2013), weil ihre Rekrutierung als erschwert vorweggenommen und die Arbeit mit interkulturellen Übersetzerinnen und Übersetzern aus forschungsökonomischen Überlegungen vermieden wird.

1.3.2 PAT – Mit Eltern Lernen

Das Hausbesuchsprogramm PAT wurde in den 1970er Jahren in den USA unter dem Namen *Parents as Teachers (PAT)* entwickelt. Es zählt zu den sechs landesweit implementierten Hausbesuchsprogrammen in den USA, die gemäss den Kriterien des Home Visiting Evidence of Effectiveness (HomVEE) Review als evidenzbasiert klassifiziert sind (Mathematica Policy Research, 2016). Es ist das Einzige dieser sechs Programme, das explizit den Bildungserfolg verbessern soll und mit der Förderung vor oder unmittelbar nach der Geburt beginnt. Abgeschlossen wird PAT in der Regel nach drei Programmjahren, eine Weiterführung bis zum fünften Geburtstag ist möglich. Dabei richtet es sich insbesondere – aber nicht ausschliesslich – an belastete Familien sowie an Familien, deren Erstsprache nicht die offizielle Landessprache ist (Astuto & LaRue, 2009). Das Programm wird von qualifizierten Elterntrainerinnen durchgeführt und beinhaltet vier Komponenten: (1) Hausbesuche zur Förderung der Eltern-Kind-Interaktion sowie um Wissen und Sensibilität für die altersgerechte Entwicklung zu erhöhen, (2) Gruppenangebote für den Erfahrungsaustausch zwischen den Eltern und für ausserfamiliale Lernanregungen für die Kinder, (3) Entwicklungsscreenings zur Früherkennung von Auffälligkeiten, (4) Vernetzung mit weiteren Unterstützungsangeboten für Familien. Bei belasteten Familien sollte PAT mit einer Intensität von zwei Hausbesuchen und einem Gruppenangebot monatlich durchgeführt werden (Parents as Teachers National Center, 2011).

Bislang wurde das Programm vor allem in Nordamerika und Neuseeland sowie einzelnen Ländern Europas, unter anderem in Deutschland (Nürnberg), implementiert. Interventionsstudien liegen aber nur aus dem angelsächsischen Raum vor. Dabei präsentiert sich die Befundlage ähnlich

heterogen wie zu Hausbesuchsprogrammen generell: Die Effekte sind weitgehend inkonsistent über die untersuchten Merkmale und Studien hinweg verteilt und mehrheitlich schwach ausgeprägt (Mathematica Policy Research, 2016). Weiter ist unklar, inwiefern sich das Programm für belastete Familien oder bestimmte Zielgruppen eignet und ob sich der postulierte indirekte Wirkmechanismus über die Eltern-Kind-Interaktion auf die kindliche Entwicklung bestätigt. Zu längerfristigen Wirkungen liegen nur wenige quasi-experimentell angelegte Studien vor, die weitgehend positive, jedoch mit zunehmendem Alter schwächer werdende Effekte für das Kindergarten- und Schulalter zeigen. Darüber hinaus weisen diese Studien eine erhöhte Wirksamkeit von PAT in Kombination mit Angeboten zur direkten Förderung der Kinder nach (Drazen & Haust, 1993; O'Brien, Garnett, & Proctor, 2002; Pfannenstiel, Seitz, & Zigler, 2002; Zigler, Pfannensstiel, & Seitz, 2008)

1.4 Folgerungen für die vorliegende Untersuchung

Zusammenfassend macht die Befundlage zu förderlichen und gefährdenden Entwicklungsbedingungen deutlich, dass der Eltern-Kind-Interaktion für die kindliche Entwicklung eine Schlüsselrolle zukommt. Insbesondere das Konstrukt der elterlichen Sensitivität hat sich als bedeutsamer Prädiktor für kindliche Entwicklungsverläufe erwiesen – unter anderem auch im Hinblick auf die Sprache. Weiter zeigt die empirische Befundlage zur frühen Förderung, dass in der Schweiz grosser Entwicklungs- und Forschungsbedarf besteht und Familien mit Migrationshintergrund in den bisherigen Untersuchungen untervertreten waren. Im Einzelnen ist nur wenig darüber bekannt,

1. wie sich der aktuelle Forschungsstand zu PAT im Hinblick auf belastete Familien präsentiert,
2. wie belastete Familien in der Schweiz frühzeitig erkannt, erreicht und zur Teilnahme an einem Programm zur frühen Förderung gewonnen werden können,
3. wie sich verschiedene Belastungskonstellationen auf die mütterliche Sensitivität und die kindliche Entwicklung auswirken,
4. inwiefern das aus den USA adaptierte Hausbesuchsprogramm PAT bei belasteten Familien in der Schweiz wirksam ist und ob der postulierte Wirkmechanismus über die Eltern-Kind-Interaktion auf die kindliche Entwicklung zum Tragen kommt.

Diese Forschungsdesiderata werden im Rahnen der vorliegenden Dissertation aufgegriffen und mit vier Studien bearbeitet:

- *Studie 1* widmet sich mittels systematischem Review dem Forschungsstand zur Wirksamkeit von PAT und soll zeigen, inwiefern PAT bei belasteten Familien unter Berücksichtigung von Merkmalen der Struktur- und Prozessqualität wirksam ist.

- *Studie 2* analysiert den Rekrutierungsprozess und das Randomisierungsverfahren im Projekt ZEPPELIN. Dadurch soll die Frage beantwortet werden, inwiefern die belasteten Familien erreicht und hinsichtlich Belastungsmerkmale ausgewogen auf die Interventionsgruppe (IG) und Kontrollgruppe (KG) verteilt wurden.
- *Studie 3* untersucht Prädiktoren mütterlicher Sensitivität mit dem Ziel, Risikokonstellationen zu identifizieren.
- *Studie 4* beschäftigt sich mit Wirkungen, Wirkmechanismen und Moderatoren der frühen Förderung mit PAT. Die Analysen sollen zeigen, inwiefern Effekte der frühen Förderung auf die sprachliche Entwicklung über die mütterliche Sensitivität vermittelt werden und ob das Ausmass der Belastung als Moderator wirkt.

Die Daten für die Studien 2 bis 4 stammen aus dem ZEPPELIN 0-3 Projekt, einer längsschnittlich angelegten Interventionsstudie, welche die Wirksamkeit von PAT an drei Projektstandorten im Kanton Zürich (Schweiz) mittels randomisiert kontrollierter Versuchsanordnung (RCT) evaluiert (Lanfranchi & Neuhauser, 2013). Untersucht werden Merkmale der Eltern, des Kindes und der Interaktion zwischen Eltern und Kind zu vier Messzeitpunkten: Im 3. (baseline-Erhebung, t_0), 12., 24. und 36. Lebensmonat (t_1-t_3). Weil in ZEPPELIN ausschliesslich Mütter untersucht wurden, wird nachfolgend der Begriff *mütterliche Sensitivität* verwendet. Im nächsten Abschnitt werden die einzelnen Studien in zusammengefasster Form dargestellt.

2. Zusammenfassung der einzelnen Studien

2.1 Studie 1: Systematisches Review zur Wirksamkeit von PAT bei belasteten Familien

Angesichts der heterogenen Befundlage zur PAT – teils in belasteten, teils in unbelasteten Populationen (vgl. Kapitel 1.3.2) – untersucht Studie 1 mittels systematischem Review die Frage, inwiefern PAT bei *belasteten* Familien unter Berücksichtigung der Struktur- und Prozessqualität wirksam ist.

Fünf Studien erfüllen die Einschlusskriterien und untersuchen belastete Familien mit tiefem Einkommen, niedrigem soziökonomischem Status (SES), Migrationshintergrund, adoleszenten Müttern oder multiplen Belastungen. Neben den Belastungsmerkmalen unterscheiden sich die Studien hinsichtlich Breite des untersuchten Angebots (in zwei Studien wurde PAT in Kombination mit anderen Unterstützungsangeboten durchgeführt), Programmakzeptanz (unterschiedliche Ausstiegsquoten) sowie der fürs Review bedeutsamen Messzeitpunkte (im Alter von 24 Monaten, 36 Monaten und im Alter von 4 und 5 Jahren) – was die Vergleichbarkeit der Effekte zwischen den Studien erschwert. Über alle Untersuchungen hinweg zeigt sich auch bei den belasteten Familien hinsichtlich Wirksamkeit ein heterogenes Bild: Die Effektstärken variieren zwischen den Studien und den untersuchten Merkmalen mit mehrheitlich schwacher und vereinzelt substanzieller Ausprägung, wobei

das Signifikanzniveau nur selten erreicht wird. Weitgehend konsistent und teilweise signifikant sind die Ergebnisse bei den am stärksten belasteten Familien und in den Bereichen der kognitiven, sprachlichen und sozialen Entwicklung. Hinsichtlich *Strukturqualität* lassen sich die Ergebnisse dahingehend interpretieren, dass die Effekte bei höherer Belastung und in Kombination mit Kommstrukturen umfassender und stärker sind. Bezüglich *Prozessqualität* deutet die Befundlage darauf hin, dass die vorgesehene Programmintensität für belastete Familien (zwei Hausbesuche pro Monat) in keiner Studie erreicht wurde. Die Gruppenangebote fanden entweder nicht statt oder wurden nur sehr selten genutzt. Dessen ungeachtet gibt es Hinweise darauf, dass eine höhere Programmintensität (Hausbesuche) zu stärkeren Effekten führt. Die Ergebnisse legen somit nahe, dass für die Wirksamkeit von PAT bei belasteten Familien die Struktur- und Prozessqualität eine wichtige Rolle spielen.

2.2 Studie 2: Erreichbarkeit und Randomisierung belasteter Familien

Belastete Familien gelten für Angebote der frühen Förderung als schwer erreichbar (Heinrichs et al., 2005). In RCT-Studien verschärft sich dieses Problem, weil bei der Anfrage zur Studienteilnahme noch unklar ist, ob die Familien der IG oder KG zugeteilt werden bzw. ob die Familie die erwünschte Form der Unterstützung erhalten wird. Gleichwohl werden RCT-Studien als Standard für den Wirksamkeitsnachweis von präventiven Angeboten angesehen (Gottfredson et al., 2015) – allerdings besteht im deutschsprachigen Raum nur wenig Erfahrung bei deren Umsetzung im Bereich der frühen Förderung (Buschhorn, 2012). Vor diesem Hintergrund hat Studie 2 zum Ziel, die im Projekt ZEPPELIN umgesetzten Konzepte zur Rekrutierung und Randomisierung der Stichprobe zu überprüfen. Dazu werden zwei Fragen untersucht: (1) Inwiefern werden belastete Familien erreicht? (2) Inwiefern werden die belasteten Familien mittels Randomisierung ausgewogen auf die IG und KG verteilt?

Die Rekrutierung der Familien erfolgte während eines Jahres mit Hilfe eines interdisziplinären Netzwerks bestehend aus Fachpersonen aus dem psychosozialen (z.B. Mütter- und Väterberatung, Soziale Dienste, Erziehungsberatung) und medizinischen Versorgungsfeld (z.B. Pädiatrie, Geburtskliniken). Von den 587 bei ZEPPELIN angemeldeten Familien wurden 552 (94%) erreicht und von den erreichten Familien 439 (80%) mittels Kurzscreening als belastet eingeschätzt. Gemessen an der Gesamtgeburtenzahl während der Rekrutierungsphase in den Projektgemeinden waren somit 18% der Kinder mit Risiken belastet. Von den belasteten Familien partizipierten schliesslich 251 (60%) am Projekt, die anderen 40% verweigerten die Teilnahme, in Einzelfällen waren andere Gründe wie z.B. Wohnortwechsel ausschlaggebend. Das Ausmass der Belastung wurde anhand der Daten aus der baseline-Erhebung (t_0) mit der Heidelberger Belastungsskala (HBS) eingeschätzt (Sidor et al., 2012). Bei 75% der Familien lag der Wert in einem Bereich, der gemäss HBS-Kriterien eine Intervention indiziert (HBS $\geq$ 40). Weiter sind in der Stichprobe Risikofaktoren wie z.B. niedriger SES,

Frühgeburt, Ausländerstatus oder Migrationshintergrund im Vergleich mit Schweizer Normwerten ungünstiger ausgeprägt.

Nach der Zusage zur Projektteilnahme wurden die Familien mittels stratifizierter Blockrandomisierung auf die IG und KG verteilt. Der Vergleich zwischen IG und KG bezüglich soziodemographischer Merkmale und ausgewählter Risikofaktoren ergibt keine signifikanten Unterschiede. Gleichwohl ist in der IG der Mädchenanteil und das Ausmass der Gesamtbelastung leicht höher als in der KG, was aber nicht als Misserfolg der Randomisierung zu interpretieren ist. Bei einer Randomisierung kann es immer vorkommen, dass Merkmale nicht gleich verteilt sind – da diese auf dem Zufall beruht. Insgesamt zeigen die Ergebnisse, dass belastete Familien erreicht wurden und ihre Verteilung auf IG und KG hinsichtlich Risikofaktoren und soziodemographischer Merkmale ausgewogen ist.

2.3 Studie 3: Prädiktoren mütterlicher Sensitivität in belasteten Familien

Die Stärkung der elterlichen Sensitivität gilt als wichtiger Präventionsansatz, um die Entwicklungsbedingungen für das Kind förderlich zu gestalten und damit Entwicklungsauffälligkeiten zu vermeiden (Gloger-Tippelt, 2010; Ziegenhain, 2008). Das ist nur dann möglich, wenn zentrale Prädiktoren elterlicher Sensitivität bekannt sind – einerseits zur Früherkennung von Risiken und andererseits zur Entwicklung darauf abgestimmter Interventionen. In diesem Zusammenhang untersucht Studie 3 anhand der baseline-Daten (t_0), inwiefern sich materielle, personal-familiale, soziale und kindbezogene Belastungsfaktoren sowie die Kombination dieser Faktoren (Interaktionseffekte) auf die mütterliche Sensitivität auswirken.

Zunächst zeigen die Analysen, dass die Gesamtbelastung einen negativen Einfluss auf die mütterliche Sensitivität ausübt: Umso höher die Belastung, desto tiefer die mütterliche Sensitivität. Bei der differenzierten Untersuchung der einzelnen Belastungsfaktoren und der Interaktionseffekte erweisen sich die soziale Belastung sowie die Interaktion zwischen materieller und personal-familialer Belastung als signifikante Prädiktoren. Der Interaktionseffekt bedeutet, dass sich personal-familiale Belastung nur bei zugleich auftretender materieller Belastung negativ auf die mütterliche Sensitivität auswirkt (und umgekehrt). Darüber hinaus steht der Bildungsstand der Mutter mit der mütterlichen Sensitivität in einem positiven Zusammenhang: Umso höher die Bildung, desto sensitiver interagieren die Mütter mit ihren Kindern – auch wenn Belastungen vorhanden sind. Somit konnten für die ersten Monate nach der Geburt relevante Prädiktoren mütterlicher Sensitivität identifiziert werden.

2.4 Studie 4: Wirkmechanismen und Moderation früher Förderung mit PAT

PAT sowie zahlreiche andere Interventionsprogramme basieren auf der Modellannahme, über die Verbesserung der Qualität der Eltern-Kind-Interaktion die kindliche Entwicklung zu fördern. Die empirische Überprüfung dieses Wirkmodells wird zwar gefordert (Gottfredson et al., 2015), aber nur selten erbracht (Coles, Cheyne, & Daniel, 2015; Reynolds & Ou, 2015) – obwohl seine Bestätigung zur kausalen Inferenz, Generalisierbarkeit und zur konzeptuellen Weiterentwicklung der Programme beitragen könnte (Reynolds & Ou, 2015). Vor diesem Hintergrund widmet sich Studie 4 der Frage, inwiefern sich PAT indirekt über die mütterliche Sensitivität (t_1) auf die rezeptive und expressive Sprache auswirkt (t_2, t_3). Weiter sollen die Analysen zeigen, ob PAT bei höher belasteten Familien stärker wirksam ist bzw. inwiefern allfällige Effekte durch das Ausmass der Belastung moderiert werden.

Zunächst wurde die Vergleichbarkeit von IG und KG über alle Messzeitpunkte hinweg untersucht, wobei kein differentieller Dropout zwischen t_0 und t_3 nachweisbar war und sich die Ausfallquote in IG und KG – im Vergleich mit vorangegangenen Studien zu PAT und Hausbesuchsprogrammen generell – als sehr niedrig erwies. Weiter wird deutlich, dass die vorgesehene Programmintensität (zwei Hausbesuche pro Monat) nicht erreicht wurde, es fanden im Mittel 1.4 Hausbesuche pro Monat statt. Zudem wurden die Gruppenangebote nur selten genutzt, im Durchschnitt alle drei Monate einmal.

Hinsichtlich *Wirksamkeit* ist ein signifikanter Effekt von PAT auf die mütterliche Sensitivität zu t_1 sowie auf die expressive Sprache zu t_3 nachweisbar. Die Analyse der *Wirkmechanismen* ergibt, dass der Interventionseffekt auf die expressive Sprache zu t_3 über die mütterliche Sensitivität zu t_1 und die rezeptive Sprache zu t_2 vermittelt wird (multiple serielle Mediation) – was neben den PAT-Modellannahmen (Parents as Teachers National Center, 2011) auch Erkenntnissen aus der Entwicklungspsychologie entspricht, wonach die Entwicklung der rezeptiven Sprache der Entwicklung der expressiven Sprache vorangeht (Clark, 1993). Die direkten und indirekten Interventionseffekte werden durch die Belastung *moderiert*: Bei Familien mit höherer Belastung sind die Effekte von PAT stärker als bei Familien mit tieferer Belastung. Zudem zeigen die Ergebnisse, dass sich Belastung negativ auf die Sensitivität (t_1) und auf alle Variablen zur rezeptiven und expressiven Sprache auswirkt (t_2, t_3).

3. Übergeordnete Diskussion

Die vorliegende Dissertation hat zum Ziel, frühe Förderung mit dem Hausbesuchsprogramm PAT in belasteten Familien zu untersuchen. Dazu wurden vier Studien durchgeführt, deren Ergebnisse sich in dreifacher Hinsicht diskutieren lassen: (1) Konnte die Zielgruppe erreicht, randomisiert und im Projekt gehalten werden? (2) Wie wirkt sich Belastung auf die mütterliche Sensitivität und die Sprachentwicklung aus? (3) Inwiefern ist PAT bei belasteten Familien wirksam? An die Diskussion an-

knüpfend werden Einschränkungen und Stärken der Untersuchung beschrieben sowie Schlussfolgerungen für die Forschung und die Programmentwicklung gezogen.

(1) Konnte die Zielgruppe erreicht, randomisiert und im Projekt gehalten werden?

Die Ergebnisse aus Studie 2 zeigen, dass während der einjährigen Rekrutierungsphase die Zielgruppe (belastete Familien) *erreicht* wurde: Das Ausmass der Belastung lag bei 75% der Familien in einem Bereich, der eine Intervention indiziert (Sidor et al., 2012). Bemerkenswert ist, dass auch Zugang zu Familien mit Migrationshintergrund gefunden wurde. Sie sind in der Stichprobe deutlich überrepräsentiert, wie auch Familien mit anderen Risikofaktoren. Die *projektbasierte Rekrutierungsquote* bzw. *Programmreichweite* (Studie 2) betrug 60%, was im Vergleich mit anderen Untersuchungen zur selektiven Prävention als hoch einzustufen ist (Heinrichs et al., 2005). Daraus kann gefolgert werden, dass PAT den Bedarf nach früher Förderung deckt und von der Zielgruppe angenommen wird (Jungmann & Brand, 2012).

Im Hinblick auf den Erfolg der *Randomisierung* zeigt Studie 2, dass sich IG und KG bezüglich der untersuchten soziodemographischen Merkmale und Risikofaktoren bei der baseline-Messung (t_0) nicht signifikant unterscheiden. Das Ergebnis der Randomisierung ist daher als erfolgreich zu bewerten: Es ist davon auszugehen, dass bekannte und unbekannte personengebundene Störgrößen gleichmäßig auf IG und KG verteilt sind und Unterschiede zwischen den beiden Gruppen mit hoher Wahrscheinlichkeit kausal auf die Intervention mit PAT zurückzuführen sind. Das gilt auch für die nachfolgenden Messzeitpunkte, wie die Ergebnisse der *Ausfallanalyse* (Studie 4) zeigen: Zwischen der baseline-Messung (t_0) und der letzten Messung (t_3) ist keine relevante Veränderung in der Stichprobenzusammensetzung hinsichtlich der Gesamtbelastung (HBS) sowie weiterer Risikofaktoren (z.B. SES, Einelternhaushalte, Geburtsgewicht, Ausländerstatus, Sprachkenntnisse, Bildung) feststellbar. Die Risikofaktoren bleiben sowohl in der IG als auch in der KG über die Zeit stabil. Zudem ist die Verbleibquote im Vergleich mit vorangegangenen PAT-Studien aus den USA (Studie 1) sowie Hausbesuchsprogrammen generell (Gomby, 2005) als hoch einzuschätzen. Somit wird deutlich, dass belastete Familien nicht nur erreicht, sondern auch in der Stichprobe gehalten werden konnten.

(2) Wie wirkt sich Belastung auf die mütterliche Sensitivität und die Sprachentwicklung aus?

Mit stärker werdender *Gesamtbelastung* (HBS) sind die Mütter weniger in der Lage, in einer dreiminütigen Spielsequenz sensitiv mit ihrem Kind zu interagieren (Studien 3 und 4). Die Gesamtbelastung hat zudem einen negativen Einfluss auf die die rezeptive und expressive Sprache (Studie 4). Damit bestätigt sich die breit abgestützte Befundlage, wonach sich Belastungen ungünstig auf das Elternverhalten und die kindliche Entwicklung auswirken (Belsky, 1984, 2014; Heilig, 2014).

Die *simultane Untersuchung verschiedener Belastungsfaktoren* (Studie 3) ergibt ein differenzierteres Bild: Soziale Belastung sowie die Kombination von materieller Belastung mit personal-

familialer Belastung wirken sich negativ auf die mütterliche Sensitivität aus. Demgegenüber hat ein hoher Bildungsstand einen positiven Einfluss auf die mütterliche Sensitivität, unabhängig von der Belastungskonstellation. Diese Ergebnisse entsprechen dem Forschungsstand zur Bedeutsamkeit sozialer Unterstützung (Crnic, Greenberg, Ragozin, Robinson, & Basham, 1983; Crockenberg & McCluskey, 1986; Jackson, Preston, & Thomas, 2013; Shin, Park, & Kim, 2006) und zur protektiven Wirkung von Bildung (Gudmundson, 2012). Zudem zeigen die Analysen, dass sich Belastungen in ihrem Einfluss gegenseitig verstärken können (Heilig, 2014). Der fehlende Zusammenhang zwischen kindbezogener Belastung und mütterlicher Sensitivität könnte darin begründet sein, dass in Familien mit einer höheren kindbezogenen Belastung die Mütter mehr Ressourcen aufwiesen (höhere Bildung und längere Aufenthaltsdauer in der Schweiz) und sie daher besser in der Lage waren, mit der kindbezogenen Belastung umzugehen. Insgesamt zeigen die Ergebnisse, dass neben der Gesamtbelastung spezifische Prädiktoren für die mütterliche Sensitivität identifiziert werden konnten. Sie liefern Anhaltspunkte für die Früherkennung von Risikokonstellationen und die Entwicklung von Interventionen (vgl. Schlussfolgerungen in Kapitel 5).

(3) Inwiefern ist PAT bei belasteten Familien wirksam?

Das systematische Review zur *Wirksamkeit* von PAT bei belasteten Familien (Studie 1) zeigt anhand von fünf Studien aus den USA, dass die Effekte zusammen mit Merkmalen der Struktur-, Prozess- und Untersuchungsqualität variieren und daher schwierig zu generalisieren sind. Über die einzelnen Studien hinweg sind die Effekte mehrheitlich klein, vereinzelt substanziell und nur selten signifikant – wobei letzteres auf die tiefe statistische Power infolge kleiner Stichprobengrössen zurückzuführen sein dürfte. Somit widerspiegelt sich im Review zu PAT die heterogene Befundlage zur Wirksamkeit von Hausbesuchsprogrammen generell (Avellar et al., 2016; Filene et al., 2013; Gomby, 2005; Sweet & Appelbaum, 2004). Die eigenen Analysen (Studie 4) ergänzen die Resultate zur Wirksamkeit von PAT mit Daten aus der Schweiz. Sie ergeben, dass sich PAT positiv auf die mütterliche Sensitivität im Alter von 12 Monaten und auf die expressive Sprache im Alter von 36 Monaten auswirkt – auch hier mit kleinen Effekten. Da die Förderung der Eltern-Kind-Interaktion ein wichtiges Ziel von PAT darstellt, aber bislang nur in einer Studie mit erheblichen Implementierungsproblemen videobasiert untersucht wurde (vgl. Studie 1), trägt das Ergebnis zur mütterlichen Sensitivität zur Verkleinerung dieser Forschungslücke bei. In diesem Zusammenhang wären die Effekte bei Programmabschluss (t_3) von besonderem Interesse, sie konnten aber noch nicht ausgewertet werden. Bemerkenswert ist zudem, dass trotz der im Vergleich mit den USA hohen Standardversorgung in der Schweiz Effekte von PAT nachweisbar sind (Benz & Sidor, 2013). Generell macht der Forschungsüberblick zu PAT (Studie 1) deutlich, dass die primäre Zielvariable – nämlich der Schulerfolg der Kinder – bislang nur unzulänglich evaluiert wurde. Daher sind follow-up Studien notwendig, die längerfristige Effekte von PAT mit ausreichend grossen Stichproben und elaboriertem Forschungsdesign untersuchen.

Angesichts der beschriebenen heterogenen Befundlage stellt sich die Frage, unter welchen Bedingungen und über welche Mechanismen PAT wirksam ist. Hinsichtlich der *Bedingungen* – gemeint sind Struktur- und Prozessmerkmale – lassen sich die Ergebnisse aus den Studien 1 und 4 dahingehend interpretieren, dass PAT bei belasteten Familien zu besseren Resultaten führt: Zum einen weisen bisherige Studien in den belasteten Subgruppen mehr signifikante Effekte nach als in den jeweiligen Gesamtstichproben (Studie 1), zum andern zeigen die eigenen Daten, dass mit dem Ausmass der Belastung die Effektstärke steigt (Studie 4). Weiter scheinen eine höhere Intensität sowie die Kombination von PAT mit Kommstrukturen mit stärkeren Effekten zusammenzuhängen (Studie 1). Diese Befunde entsprechen weitgehend den bisherigen Erkenntnissen zur Moderation der Wirksamkeit durch Struktur- und Prozessmerkmale bei Hausbesuchsprogrammen (Blok et al., 2005; Gomby, 2005; Nievar et al., 2010). Sie verweisen auf das Potenzial von PAT, welches bislang nur selten ausgeschöpft werden konnte, wie die in Studien 1 und 4 beschriebenen Implementierungsschwierigkeiten zeigen. Die Analysen legen somit nahe, dass für die Wirksamkeit von PAT die Struktur- und Prozessqualität eine wichtige Rolle spielen. Daraus lässt sich eine mögliche Richtung für Forschung und Entwicklung ableiten (vgl. Schlussfolgerungen in Kapitel 5).

Im Hinblick auf die *Wirkmechanismen* zeigen die Mediationsanalysen aus Studie 4, dass der Effekt von PAT auf die expressive Sprache im Alter von 36 Monaten über die mütterliche Sensitivität im Alter von 12 Monaten und die rezeptive Sprache im Alter von 24 Monaten vermittelt wird. Somit bestätigen sich die PAT-Modellannahmen, wonach sich die frühe Förderung über eine Verbesserung der Eltern-Kind-Interaktion auf die kindliche Entwicklung auswirkt (Parents as Teachers National Center, 2011) – was wiederum als Beleg für die Programmwirksamkeit interpretiert werden kann (Reynolds & Ou, 2015). Weiter würde interessieren, inwiefern Interventionseffekte über andere Merkmale der Eltern-Kind-Interaktion vermittelt werden, wie z.B. über den häuslichen Anregungsgehalt. Die Kenntnis solcher Wirkmechanismen kann dazu beitragen Förderkonzepte zu optimieren, etwa mittels Stärkung effektiver Programmelemente.

4. Stärken und Einschränkungen

Zu den Stärken der Untersuchung zählen das elaborierte Forschungsdesign (Gottfredson et al., 2015), ihre längsschnittliche Ausrichtung sowie die hohe Verbleibquote der teilnehmenden Familien (vgl. Studie 4). Weiter sind das Erreichen der Zielgruppe sowie die interkulturelle Zusammensetzung der Stichprobe als Stärke zu nennen, was bislang oft gefordert aber selten umgesetzt werden konnte (Avellar et al., 2016; Heinrichs et al., 2005). Mit der heterogenen Zusammensetzung der Stichprobe sind zugleich Einschränkungen verknüpft: Die schriftlichen und mündlichen Befragungen wurden in verschiedenen Sprachen durchgeführt, teilweise unterstützt durch interkulturelle Übersetzerinnen und Übersetzer. Deshalb war es wichtig, in den Auswertungen die Deutschkenntnisse als Kontrollvariable zu berücksichtigen. Gleichwohl kann nicht ausgeschlossen werden, dass

die sprachliche Heterogenität zu Fehlervarianz geführt hat. Eine weitere Einschränkung betrifft die weitgehende Abwesenheit der Väter, die für die kindliche Entwicklung ebenfalls eine wichtige Rolle spielen. Obwohl sich das Projekt an Familien richtete, nahmen primär die Mütter an PAT teil. Direkte und indirekte Effekte der frühen Förderung auf die Väter konnten daher nicht untersucht werden. Und schliesslich bleibt offen, inwiefern PAT in den eigenen Daten Effekte auf weitere Eltern- und Kindesmerkmale zeigt – die Untersuchungen in der vorliegenden Dissertation haben sich auf die mütterliche Sensitivität und die Sprachentwicklung beschränkt.

5. Schlussfolgerung und Ausblick

In der vorliegenden Dissertation wurden verschiedene Forschungsfragen bearbeitet, die zu einem besseren Verständnis der Wirksamkeitsbedingungen und Wirkmechanismen von PAT bei belasteten Familien beitragen sollen. Ausgehend von den zentralen Erkenntnissen, werden nachfolgend Folgerungen für Forschung und Programmentwicklung gezogen.

5.1 Belastete Familien erreichen

Frühe Förderung im Bereich der selektiven Prävention hat zur Voraussetzung, die Zielgruppe früh zu erkennen, zu erreichen und im Programm zu halten – was angesichts des Präventionsdilemmas mit Herausforderungen verknüpft ist (Heinrichs et al., 2005). Die Ergebnisse der vorliegenden Untersuchung belegen, dass der Zugang zu belasteten Familien (Studie 2) sowie die Durchführung eines dreijährigen Programms mit einer hohen Verbleibquote (Studie 4) gelingen kann – jedoch mit einem erheblichen Aufwand verbunden ist. Um belastete Familien für die Teilnahme an früher Förderung zu gewinnen sind folgende Punkte zentral: (1) Zur Rekrutierung der Familien sollte an bestehende und etablierte Einrichtungen im Frühbereich angeknüpft werden, um ein interdisziplinäres Netzwerk mit Fachpersonen aus dem psychosozialen und medizinischen Versorgungsfeld zu implementieren. (2) Die Angebote sollten Gehstrukturen beinhalten, die den Familien einen niederschwelligen Zugang zu früher Förderung ermöglichen. (3) Die Familien müssen zur Teilnahme ermutigt werden, wenn nötig mit zusätzlichen Anstrengungen: Knapp 10% der erreichten Familien konnten über die Regelstrukturen nicht direkt kontaktiert werden, sondern erst durch gezielte Nachfrage bei Pädiaterinnen und Pädiatern, sozialen Diensten oder über spontane Hausbesuche. (4) Der Verbleib der Familien im Angebot muss gesichert werden. Anreizsysteme (z.B. Geburtstagsgeschenke für die Kinder) oder Erinnerungshilfen (z.B. per SMS) können dazu beitragen, mit den Familien in Kontakt zu bleiben und die Verbindlichkeit zu erhöhen. Bei Interventionsstudien ist in diesem Zusammenhang der KG besondere Aufmerksamkeit zu schenken.

Trotz der hohen Programmreichweite im Projekt ZEPPELIN ist zu bedenken, dass 40% der Familien die Teilnahme verweigerten – hauptsächlich mit der Begründung keinen Bedarf oder keine Zeit zu haben. Es ist aber zu vermuten, dass sich hinter diesen pauschalen Antwortkategorien oft subtilere Gründe der Teilnahmeverweigerung verbergen, wie z.B. fehlendes Vertrauen in die Programmanbieter, Angst vor Verletzungen der Privatsphäre oder kulturelle Abschottung bei Familien mit Migrationshintergrund (Barlow, Kirkpatrick, Stewart-Brown, & Davis, 2005; Barnes et al., 2006; Heinrichs et al., 2005; Lanfranchi & Burgener Woeffray, 2013). Diesen Gründen nachzugehen und zu untersuchen, was zu einer Studienteilnahme oder -verweigerung führt, könnte einen wertvollen Beitrag zur Konzipierung von Präventionsangeboten und -studien leisten.

5.2 Belastungskonstellationen minimieren

Die Ergebnisse aus Studie 3 zeigen, dass neben dem Gesamtausmass der Belastung insbesondere soziale Belastung sowie die Kombination von materieller und personal-familialer Belastung ein Risiko für die mütterliche Sensitivität darstellen. Somit stellt sich die Frage, inwiefern diese Risikokonstellationen durch PAT erkannt und reduziert werden können. Denn Risiken zu minimieren und die Sensitivität gleichzeitig zu fördern gilt als erfolgsversprechende Förderstrategie – insbesondere bei Familien mit Migrationshintergrund (Heilig, 2014; Mesman, van Ijzendoorn, & Bakermans-Kranenburg, 2012). Übertragen auf die beschriebenen Risikokonstellationen würde das für die frühe Förderung mit PAT bedeuten, die soziale Vernetzung zu unterstützen und Bewältigungsstrategien im Umgang mit materiellen, sozialen und personal-familialen Problemlagen zu vermitteln. Dabei ist sorgfältig zu prüfen, welches die Möglichkeiten und Grenzen von PAT sind und unter welchen Bedingungen die Einbindung der Familien in etablierte Unterstützungssysteme sinnvoll ist (Ziegenhain, 2004). Angesichts der hohen Programmreichweite (Studie 2) stellt die Vermittlung passgenauer Hilfsangebote eine grosse Chance der frühen Förderung mit PAT dar.

5.3 Wirksamkeitsbedingungen optimieren

Sowohl das systematische Review zur Wirksamkeit von PAT (Studie 1) als auch die Untersuchung der Wirkmechanismen (Studie 4) machen deutlich, dass mit der Höhe der Belastung die Wirksamkeit von PAT umfassender und stärker wird. Ein nächstes Ziel für die Forschung könnte folglich sein, Risikokonstellationen zu identifizieren, die für die Förderung mit PAT besonders geeignet sind. Konsequenterweise müssten dann auf Ebene Praxis die Zielgruppen enger definiert, gezielt rekrutiert und spezifisch gefördert werden (Ziegenhain, 2007).

Weiter gibt es Anhaltspunkte dafür, dass bei einer höheren Programmintensität stärkere Effekte zu erwarten sind (Studie 1). Gleichwohl fällt bei Hausbesuchsprogrammen generell und bei PAT im Speziellen auf (Studien 1 und 4), dass die Programmvorgaben kaum je erfüllt werden (Gomby,

2005) – was die Frage nach der Passung zwischen der Programmkonzeption und den Bedürfnissen der Familien aufwirft. Besonders deutlich zeigt sich diese Problematik bei den Gruppenangeboten: Sie sind gemäss PAT-Programmkonzeption ein wichtiges Mittel zum Abbau sozialer Belastung, werden von den Familien aber nur selten genutzt. Diese Diskrepanz bedarf vor allem auch deshalb der Klärung, weil sich die soziale Belastung als wichtiger Prädiktor für die mütterliche Sensitivität erwiesen hat (Studie 3). Somit interessieren sowohl die Gründe für die tiefe Teilnahmequote als auch die familialen Bedürfnislagen zur sozialen Vernetzung. Beides könnte helfen, die Angebote von PAT zu optimieren und deren Anschlussfähigkeit zu erhöhen.

Die effektivste Strategie früher Förderung besteht in der Kombination von indirekten mit direkten Formen der Unterstützung (Blok et al., 2005). Das zeigt sich nicht nur in den vielzitierten Modellprojekten wie dem High/Scope Perry Preschool Program (Schweinhart, 2005), sondern auch in einzelnen Studien zu PAT (Drazen & Haust, 1993; Pfannenstiel et al., 2002; Zigler et al., 2008). Vor diesem Hintergrund wäre die Ergänzung von PAT mit qualitativ hochwertigen Formen der direkten Förderung anzustreben und zu untersuchen, inwiefern daraus ein zusätzlicher Nutzen für die Entwicklung der Kinder resultiert.

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A closer look at the effectiveness of early childhood education in at-risk families[1]

Abstract. Various reviews and meta-analyses provide heterogeneous but predominantly positive assessments of programs for early child care and education. Against this background, the crucial point is whether and under what conditions a program exhibits effects in a certain target group. This question is examined in the present article at the example of the program Parents as Teachers (PAT) in at-risk families. Based on five systematically selected studies, the analyses show that PAT is effective with small to medium effect sizes and that only implementations in accordance with the program's manual will demonstrate effectiveness.

1. Introduction

According to the results of international comparisons of educational attainment, such as PISA, schools are still contending with the problem that educational success is largely a matter of social origin (European Agency for Development in Special Needs Education, 2010; OECD, 2010). For this reason, numerous OECD countries fall back on programs for early child care and education (ECCE) that systematically target at-risk populations as defined by social, economic, cultural or psychological criteria (Eurydice, 2009). Psychosocial risks, such as parents' low educational attainment, poverty, social isolation or parents' mental illness, can restrict family interactions in a way that the child lacks the basic social and cognitive stimulation required for optimum development and educational success (Belsky, 2008; Bradley, Corwyn, McAdoo, & Garcia Coll, 2001; Huffman, Mehlinger, & Kerivan, 2000; Lemelin, Tarabulsy, & Provost, 2006; Sirin, 2005; Sroufe, Coffino, & Carlson, 2011). Accordingly, such programs aim to further the cognitive, verbal, social, emotional, and motor skills at a pre-school age. The idea is to avert difficulties with learning and development, to enhance educational opportunities in the long term and to improve social integration in the subsequent phases of life.

To assess the sustainable benefit of these ECCE programs regarding the circumstances and development of families and children, empirical proof is required in terms of effectiveness and efficiency. Particularly in English-speaking countries, there is a great deal of experience in practice and research in this field, which is well documented by the many reviews and several meta-analyses on the effectiveness of ECCE. This research has shown heterogeneous results, but the majority of recent ECCE programs have had considerable positive short-term effects and somewhat smaller long-term effects on development, with children from disadvantaged families making progress similar to or better than their more advantaged peers (Anderson et al., 2003; Barnett, 1998; Burger, 2010; Gomby, 2005; Melhuish, 2004; Mitchell, Wylie, & Carr, 2008; Olds, Sadler, & Kitzman, 2007; Siraj-Blatchford, 2004).

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In the German-speaking countries that are particularly seriously affected by origin-related disparities, recent years also have witnessed the launch of several ECCE projects within the framework of early support that are now well into the establishment and consolidation phases (Cierpka et al., 2007; Renner & Heimeshoff, 2010; Stamm et al., 2009; Ziegenhain & Künster, 2012). In many places concomitant research has not yet been completed, but initial results show mostly encouraging effects of early intervention services for families at-risk (Ayerle, 2012; Böllert, Buschhorn, & Karic, 2012; Bovenschen et al., 2012; Buschhorn, 2012; Diez Grieser & Simoni, 2011; Renner, 2012; Sidor, Kunz, Eickhorst, & Cierpka, 2013; Tschumper et al., 2012; Ziert, Kurtz, & Jungmann, 2010).

Besides this generally positive assessment of empirical findings, a closer look at the program effects reveal that they vary widely across program goals, program models, different sites implementing the same model, and even families within a single site (Bull, McCormick, Swann, & Mulvihill, 2004; Gomby, 2005). Against this background the issue is whether and under what conditions a specific concept of intervention is effective in a certain target group – for example, to improve policy and practice recommendations for parenting interventions. This question is examined in the present article at the example of the home visitation program Parents as Teachers (PAT) in at-risk families. PAT is a widespread, state-furthered program for home visitation in the US (Avellar et al., 2012) and is currently applied in German-speaking countries (www.pat-mitelternlernen.org) and in Great Britain (www.parentsasfirstteachers.org.uk). Effectiveness in at-risk families has not as yet been systematically reviewed, despite the fact that under-privileged families feature in the PAT target group. To close this gap the following issues are center-stage: (1) to what extent is the PAT program effective for at-risk families? (2) How do the conditions of implementation relate to program outcomes? (3) What type of further research is required? To address these questions, the state of research on the effectiveness of PAT in at-risk families is reviewed by way of systematically selected studies. Particular attention will be paid to features of structural and process quality and their role in explaining the effectiveness of PAT. Finally, conclusions will be drawn for further research on PAT in at-risk families.

2. Review object: The PAT program

PAT is an educational home visitation program for parents developed in the 1970s in the American state of Missouri when educators observed that children were beginning kindergarten with different levels of school readiness. In the following the focus is put on central factors of concept quality (Jungmann & Brand, 2012) such as target group, intervention aims, theory of change, core components, and manual based on the PAT Foundational Curriculum (Parents as Teachers National Center, 2011a) and the model implementation guide (Parents as Teachers National Center, 2011b).

PAT is designed to serve families *from pregnancy to age 3*, with additional curricular materials to meet the needs of parents of children aged 3 to 5 years. The program can be *universally ap-*

plied and is also suited to *at-risk families*. PAT *aims* to strengthen the learning location "family" to (1) boost parents' understanding of early childhood development and improve their parenting skills; (2) detect retarded development and health problems at an early stage; (3) avert child neglect and abuse; and (4) enhance school readiness and success in school. In the program's *Theory of Change* (or Logic Model), the objectives will be operationalized over short, medium and long-term outcomes. The outcome domains can be categorized as child development and school readiness, health, parenting, and prevention of abuse and neglect. The overall PAT approach for working with families is grounded in human ecology theory (Bronfenbrenner, 1986) and family system theory (Minuchin, 1985). Accordingly, services are provided within the family context, the approach is interaction- and relationship-focused, and the services are adapted to the broader social, cultural, and societal contexts of the families. PAT consists of four *service delivery components*:

- *Personal visits:* Home visitation is the core component of the program, with personal visits of approximately 60 minutes at least monthly, and at least biweekly for families with greater needs. Home visitors use the curriculum to deliver services that emphasize three key areas: (1) parent-child interaction: based on the developmental parenting approach (Roggman, Boyce, & Innoncenti, 2008) parent-child interaction focuses on promoting positive parenting behaviors and child development through parent-child activities; (2) development-centered parenting: based on attribution theory (Weiner, 1974) development-centered parenting focuses on the parents' understanding of how their child's developmental stage is related to his behavior which, in turn, can help parents to respond in a way that is appropriate to their child's development; and (3) family well-being: based on the constructs of empowerment (Nachshen, 2004) and self-efficacy theory (Bandura, 1977) family well-being includes a focus on family strengths, capabilities, skills, and the construction of protective factors.
- *Group connections:* Group connections are conceptualized as an opportunity for parents to share experiences, connect with other parents, and observe their child with other children. They should be provided at least monthly and include family activities, presentations, community events, or parent café.
- *Screenings:* Annual child health, hearing, vision, and developmental screenings, beginning within 90 days of enrollment, are conducted by home visitors in discussion with parents and in observation of the child. Screenings help parents understand their child's development, recognize strengths, and identify delays or problems that might suggest the need for follow-up services.
- *Resource network:* PAT maintains ongoing relationships with institutions and community organizations that serve families. Home visitors help families to identify needs and to connect with appropriate resources.

The PAT *curriculum* includes home visit plans, information about child development for parents, suggested parent-child activities, and resource materials for home visitors. Despite the standardized curriculum, there are variations in the structure and content of each visit depending on the particular home visitor, the parent and child, and the issues pertinent to the family at the time. The minimum *qualifications* for home visitors are a high school diploma and two years of previous supervised work experience with young children and/or parents. Certification at the national center requires home visitors to attend a *five-day institute and a follow-up* training within the first year, annual recertification requires a specified scope of training each year.

3. Effectiveness and program implementation

Research suggests that the success of early childhood interventions is not only influenced by the quality of the concept but also by dimensions such as the quality of planning, structure and process (Jungmann & Brand, 2012). Even if there has been no conclusive explanation of the mechanisms of impact between the various quality dimensions and outcomes so far, there is reason to assume in accordance with Gomby (2007) that the *content* of the program as delivered by the home visitors and as received by the families plays a central role in home visitation. Therefore, the most important aspects of program implementation are those that facilitate the true-to-program delivery of program content such as families served, staffing, community and policy context, program fidelity, and parental involvement (Gomby, 2007). Hence, the focus is on factors that describe the context (structural quality) and manner (process quality) in which the program is actually implemented.

3.1 Factors of structural quality

Features of families and home visitors are central to the success of home visitation. *Parents* have different needs, beliefs and interests and therefore respond to various forms of support or program features in different ways – also depending on the specific psychosocial *risk constellation* (Gomby, 2007). At the same time, *staffing* plays an important part in home visitation programs. Corresponding to the features of families, the success of a program depends on the ability of the home visitor to involve families and to create a confident relationship to persuade parents to change their behavior based on the program content (Gomby, 2007; Korfmacher et al., 2008; Krieg Schaefer, 2010). In spite of this, research can provide only limited information about the qualities of the home visitor (Gomby, 2007; Korfmacher et al., 2008), even if there is partly indication of a greater success of professional (vs. paraprofessional) home visitors (Korfmacher, O'Brien, Hiatt, & Olds, 1999). It can be assumed that extremely well-trained and experienced visitors are needed to serve families who are facing multiple risks or to work with a curriculum that allows a great deal of flexibility (Gomby, 2005; Korfmacher et al., 2008).

Another influential factor is the *community context*: in many home visitation programs, home visitors link families with community services. Thus, successfully connected families experience home visitation plus those other services. Conversely, the public policy environment shapes outcomes by setting the framework for the use of additional services (Gomby, 2007).

3.2 Factors of process quality

Parental involvement includes two broad dimensions: *participation* refers to the quantity of home visits a family receives (such as the duration or intensity of the program) and *engagement* refers to the quality of interactions with the program (such as the level to which parents show enthusiasm, commitment, and satisfaction with program services). These two dimensions may – but do not have to – interact. For example, a greater degree of participation may reflect a parent's sense of commitment to services; vice-versa, parents may well be regularly available for home visits without being genuinely engaged. There is empirical evidence suggesting that different features of participation and engagement are related to program outcomes in a variety of home visit approaches (Korfmacher et al., 2008). The most frequently investigated indicators are of a quantitative nature, such as program attrition and intensity. With home visitation programs the mean dropout rate of 50% (Gomby, 2005) is high and presents a substantial challenge for implementing such programs. Regarding the frequency of home visits with at-risk families, the meta-analysis of Nievar et al. (2010) shows that more frequent visits leads to higher success rates. By contrast, there is little systematic research on the reasons why families refrain from participating in these programs (Jungmann & Brand, 2012).

High-quality home visitation programs are carefully designed to achieve programmatic goals based on a theory of change. To achieve program success, therefore, it is important that it is implemented true to concept (Gomby, 2007). *Program fidelity* implies both *qualitative aspects*, such as the implementation of the contents and structure of the program as specified, and *quantitative aspects*, such as those described above under *parental participation*. Research findings show that a higher degree of fidelity is often associated with better outcomes (Durlak & DuPre, 2008).

4. Review process

Systematic reviews and evidence-based conclusions are increasingly important for policy and decision-making. As distinguished from conventional systematic reviews, which summarize a large number of studies, in this review a few selected papers about the PAT program will be analyzed in depth with a focus on their effectiveness for at-risk families.

4.1 Conceptual approach

The framework for the review consists of three major steps: a review of the literature, study selection, and summarizing the evidence concerning effectiveness. The first step, the literature research, is based on the Home Visiting Evidence of Effectiveness (HomVEE) review (Mathematica Policy Research, 2013). HomVEE was launched in the fall of 2009 and is updated yearly to conduct a thorough and transparent review of the home visitation research literature in English and provides an assessment of the evidence of effectiveness for home visitation program models. For German literature the database and internet searches were re-enacted.

For the second step, literature selection, eligibility criteria were specified. To be included in the review, studies had to (1) examine at-risk families as a full sample or as a subgroup, (2) compare outcomes among groups of people exposed to PAT with outcomes among groups of people not exposed to PAT (including quasi-experimental design), (3) measure outcomes defined by the outcome domains (child development and school readiness, health, parenting, prevention of abuse and neglect), (4) examine the impact of PAT using quantitative data and statistical analyses, and (5) be rated as "high" or "moderate" concerning research methods based on the HomVEE assessment respectively What Works Clearinghouse (WWC) design standards (Mathematica Policy Research, 2013). Out of the 53 identified papers, 22 quantitative analyses of effectiveness were eligible for the review. Of these, five studies satisfied the aforementioned criteria and were used for the review: Wagner, Spiker, Hernandez, Song, and Gerlach-Downie (2001) (No. 1 in Table 1); Wagner, Cameto, and Gerlach-Downie (1996) (No. 2a, 2b); Wagner, Clayton, Gerlach-Downie, and McElroy (1999) (No. 3a, 3b), Drotar, Robinson, Jeavons, and Kirchner (2008) (No. 4); Drazen and Haust (1993) (No. 5).

For the third step, summarizing the evidence of effectiveness, information about the target group, implementation, evaluation, and the outcomes in the pre-specified outcome domains was extracted. Only effects for the final measurement are reported – on the assumption that only the fully completed intervention measures trigger the full effect of the program. Information on implementation and evaluation is shown in Table 1. Table 2 embodies the summary of effect sizes in the outcome domains of the PAT program.

4.2 Effects and sample size

The present paper concentrates on studies that estimate the impact of PAT in studies rated as "high" or "moderate" in terms of research methods. These include ideally randomized controlled trials that for reasons of efficiency often feature smaller sample sizes – particularly when subgroups are analyzed. This means a loss of statistical power, a fact that must be considered when interpreting the effects. The magnitudes of effect sizes should be interpreted in the context of the interventions studied, the outcomes measured, and the samples and subsamples examined (Hill, Bloom, Black, &

Lipsey, 2008). A common guideline for gauging achievement effects in education is an effect size equal to or greater than 0.25. This level has been defined as "substantively important" and is interpreted as a qualified positive (or negative) effect, although it may not reach statistical significance (Institute of Education Sciences, 2013).

For all studies, the effect sizes reported by the authors are recorded and statistical significance is indicated if present. If there is no effect size reported, Hedges' *g* is calculated, which produces an unbiased effect size estimate for small sample sizes (Hedges, 1981). Where percentage point change was reported, the effect size calculated is the difference between the intervention and the control group.

5. Review findings

In presenting the review findings, first the different modes of implementation and evaluation, second the effects in various outcome domains, and third the effects in specific risk groups are addressed.

5.1 Program implementation

To describe the implementation of the PAT program, focus is put on the features of structural and process quality that relate to program outcomes (see Table 1).

5.1.1 Structural quality

The samples were taken from US populations in various communities subject to *various psychosocial risks*. The data were partially evaluated in the form of subsamples for specific types of stresses. The risks embody low income, migration background in combination with a restricted understanding of the English language, adolescent motherhood, and low socio-economic status. The *high risk* sample was affected by multiple risk factors, such as poverty, low level of education, substance abuse, precarious living conditions, adolescent pregnancy, retarded development of the child, abuse and/or neglect.

In all studies PAT was implemented by *trained PAT home visitors*. The information reported on educational background and professional experience shows that the majority of parent trainers held a college qualification and for the most part have professional experience with children and/or families, even if in different professional contexts.

Table 1. Summary of program implementation and evaluation quality of the selected PAT studies.

Quality factors	1 Wagner et al. 2001	2a Wagner et al. 1996	2b Wagner et al. 1996	3a Wagner et al. 1999	3b Wagner et al. 1999	4 Drotar et al. 2008	5 Drazen & Haust 1993
Risk constellation	Poverty: Annual income lower than 15 000 USD	Mother under 19 yrs. (pregnant or with child under 6 mos.)	Mother under 19 yrs. (pregnant or with child under 6 mos.)	Latin-American immigrant background, primarily Spanish speaking	Latin-American immigrant background, English speaking or bilingual	Low socio-economic status (SES)	High risk: Multiple psychosocial risks
Location	3 locations (urban character)	Los Angeles, San Bernardino, San Diego, Santa Barbara	Los Angeles, San Bernardino, San Diego, Santa Barbara	Salinas Valley, California (rural character)	Salinas Valley, California (rural character)	Cleveland, Ohio, and Suburbs	Binghamton (New York)
Staffing							
Minimum education	High School	College		College			
Working experience with children		Partly		All			
Training	Weeklong training	Weeklong training	Weeklong training	Weeklong training	Weeklong training	Weeklong training	Trained and certified
Services received							
Treatment IG	PAT	PAT	PAT & case management	PAT	PAT	PAT	PAT & Headstart/Pre-Kindergarten
Treatment CG	No	No	No	No	No	Educational handouts and access to developmental activities	Headstart/Pre-Kindergarten
Fidelity (qualitative)	Certified by PATNC staff					90% of curriculum objectives met	
Dosage							
Number[a] HV	12.9[b]	16.8	16.2	18.2[c]	19.9[c]		
Intensity[d] HV	0.70[b]	0.69	0.65	0.61[c]	0.65[c]		
Number[a] GM		2.4	2.9	0.30[c]	0.26[c]		
Participation rate GM		62%	63%	9%[c]	17%[c]		
Intensity[d] GM		0.10	0.12	0.01[c]	0.01[c]		
Family involvement							
N[e] (IG/CG)	31/47	94/101	83/101	96/64	78/51	64/66[f]	20/20
Post-baseline attrition (IG/CG)	80%/80%	47%/43%	53%/43%	30%/24%	32%/26%	27%/24%[b]	
Quality of research methods	Moderate (RCT)	Moderate (RCT)	Moderate (RCT)	High (RCT)	High (RCT)	High (RCT)	Moderate (QES)
Outcome measurements	12, 24 mos.	12, 24 mos.	12, 24 mos.	12, 24, 36 mos.	12, 24, 36 mos.	12, 18, 24, 36 mos.	4 and 5 yrs.

Note. IG = intervention group; CG = control group; HV = home visit; GM = group meeting, RCT = randomized controlled trial, QES = quasi experimental study.
[a]Number: average number of home visits or group meetings until latest measurement for persisters (data without dropouts). [b]Full sample data (no subgroup data reported). [c]Data including dropouts (no subgroup data reported for persisters). [d]Intensity: average number of home visits or group meetings per month of participation for persisters (data without dropouts). [e]Largest risk group at latest measurement. [f]*N* at enrollment (no subgroup data reported for latest measurement).

In two of the five studies, PAT was offered with *additional forms of support*. On the one hand, in study no. 5, children received additional support by follow-up services in Headstart and pre-kindergarten classes. On the other hand, in the teenager study (see Table 1: No. 2a, 2b), three interventions can be discerned: PAT, case management support, such as that provided by California's Adolescent Family Life Program (AFLP), and the combination of PAT and case management. Furthermore, some families from the intervention group were successfully connected to *other services* (e.g., adult education and/or organized childrens' activities) and families from the control group also utilized community services (without data from Tables) (Wagner et al., 1996; Wagner et al., 1999; Wagner et al., 2001).

5.1.2 Process quality

Program fidelity was qualitatively examined only in study no. 4. In study no. 1, it was certified that PAT was implemented appropriately in spite of the fact that information on evaluation methods was not provided and group meetings were not held at all project locations (Wagner et al., 2001).

Regarding *program duration*, the evaluation of the PAT program was only carried out directly upon completion of the program, i.e., when the child reached the age of 3, in two studies (No. 3a, 3b, 4). In the other studies, family support was either provided for one less year (No. 1, 2a, 2b) or there are no details at all as to program participation (No. 5).

The *intensity* of the program application was determined by the average number of home visits and group meetings per month of participation. As recommended by the PAT program (Parents as Teachers National Center, 2011a, Parents as Teachers National Center, 2011b), in at-risk families home visits were to be made twice and group meetings once a month. In no experimental study were these specifications carried out, i.e., the intensity was less than one home visit per month everywhere (see Table 1: Intensity) or "less than optimal" in study no. 4 (Drotar et al., 2008). The reasons for the low intensity were minority status (Wagner et al., 1996; Wagner et al., 1999), young age, and low income (Wagner et al., 2001). Similarly, less frequent use than expected was made of the group activities on offer – and this twofold. First, not all families took part, and second, the offered activities were attended to an unexpectedly low degree of intensity (see Table 1: Participation rate at group meetings).

Two studies (No. 1, 2) were noticeable for their significant *attrition*. This is particularly clear in study no. 1. The dropout rate was so high that the study had to be prematurely terminated when the children reached the age of 24 months at two sites (Wagner et al., 2001). According to further analyses, the most frequently named reasons for dropping out – with different priorities and depending on the study – were the family moving away from the program area, accessibility challenges (e.g., failure to keep appointments) or disinterest (Drotar et al., 2008; Wagner et al., 1996; Wagner et al., 1999; Wagner et al., 2001). Dropout rates tend to be higher with/for young motherhood, minority status, low income, and poor educational qualifications (Wagner et al., 1996; Wagner et al., 2001).

Parental engagement, i.e., level of commitment in different areas during home visitation and in recommended activities between visits, was assessed in studies no. 1 and 3 on a scale from 0-7 by the home visitors (without data from Tables). In both studies, the full sample is estimated as high with a global score of 6 points. For low income families and Latina mothers, it is lower, similarly with respect to other risk factors such as, for example, low educational attainment or youth (Wagner et al., 1999; Wagner et al., 2001).

5.2 Effects in different outcome domains

With regard to *child development*, the associations between PAT and cognitive, social, self-help, physical and communication/language development outcomes was examined. The effects of the PAT program are the most clearly and consistently apparent in children's cognitive, communication/language, and social development (see Table 2). The effects are partly significant and/or substantively important, even some time after the program has been completed (No. 5). With physical and self-help development, the effects are not consistent. Whereas in certain groups the positive effects predominate, others only show very weak or inconsistent effects.

With regard to *child health*, the studies indicate that PAT children had mostly less serious injuries and less need for emergency treatment. With mothers who were included in the study during pregnancy, there is an indication of fewer children being born with a low birth weight and fewer stillbirths in the PAT group. The other items are either isolated results or no clear effects can be identified.

The third major category of outcomes examined in all studies was *parenting*, including parental knowledge, parental attitudes and parental practices. As shown in Table 2, the effects appear for the most part to be slightly positive with some substantively important ones – even though there is no clear consistent pattern among the risk groups. By contrast, isolated unintended weak effects can also be identified, such as that in terms of disciplinary behavior and when appropriate toys are provided. The language, literacy und numeracy promotion behavior was only traced in the low income families. The majority of the effects are positive, sporadically significant and/or meaningful.

With regard to the *parent-child relationship*, there is no evidence of positive effects. Multivariate analyses, however, indicate that the greater the intensity of the program, the higher the quality of the parent-child interactions (No. 1) (Wagner et al., 2001).

The *prevention of abuse and neglect* calls for fastidious study. The results from only three studies are available: substantial effects are shown in the teenager study with combined intervention (No. 2b) and in the "high risk" sample (No. 5) based on statistical data from the Broome County Department of Public Health and Social Services (DSS): neglect and abuse were 25% lower in PAT families than in families from the control group (see Table 2: Abuse & Neglect).

Table 2. Summary of effect sizes of the selected PAT studies for specific risk groups at the latest measurement.

Outcome domains	**1** **Very low income** **24 mos.**	**2a** **Teenager mothers** **24 mos.**	**2b** **Teenager mothers (comb. intervention)** **24 mos.**	**3a** **Spanish speaking Latinas** **36 mos.**	**3b** **English/bilingual speaking Latinas** **36 mos.**	**4** **Low socio-economic status** **36 mos.**	**5** **High risk** **4-5 yrs.**
Child development							
Cognitive development							
BSID[c] (mean)				0.50*	-0.08		
BSID (percentage within normal range)				0.65*	0.07		
DP II[d] (mean months differential)	0.07	0.09	0.29*	0.32*	0.23		
DP II (percentage at/above chronical age)				0.11	0.20		
K-ABC[e] (mental processing)						nr.	0.62[a]
K-ABC (mental processing) % below 90							-20%*[a]
K-ABC (achievement)							0.25[a]
K-ABC (achievement) % below 90							5%[a]
Bracken basic concept scale						nr.	
Mastery motivation						nr.	
Communication and language							
DP II (mean months differential)	0.12	0.06	0.01	0.13	0.07		
DP II (percentage at/above chronical age)				0.06	-0.06		
PPVT[f] (mean months differential)				0.36*	-0.11		
PPVT (percentage at/above chronical age)				0.26	-0.05		
Zimmerman preschool language scale							0.57*[a]
Zimmerman preschool lang. scale % below age level							-35%*[a]
SALT[g]						nr.	
TERA-2[h]						nr.	
Social development							
DP II (mean months differential)	0.12	0.13	0.11	0.31*	0.26		
DP II (percentage at/above chronical age)				0.21	0.47**		
ASBI[i]	0.32						
BBRS[j]						nr.	
SSRS[k]						nr.	
Attachment q-sort						nr.	
Self-help development							
DP II (mean months differential)	-0.23	-0.07	-0.05	0.27	0.25		
DP II (percentage at/above chronical age)				-0.11	0.36*		
Physical development							
BSID (mean)				0.33*	-0.19		
BSID (percentage within normal range)				0.44*	-0.26		
DP II (mean months differential)	0.12	0.00	0.09	-0.09	0.15		
DP II (percentage at/above chronical age)				-0.17	0.10		
Denver[l] (fine motor delays)							-0.30[a]
Denver (fine motor delays) % below age level							-15%[a]
Denver (gross motor delays)							-0.77*[a]
Denver (gross motor delays) % below age level							-35%*[a]

Table 2. (continued)

Outcome domains	1 Very low income 24 mos.	2a Teenager mothers 24 mos.	2b Teenager mothers (comb. intervention) 24 mos.	3a Spanish speaking Latinas 36 mos.	3b English/bilingual speaking Latinas 36 mos.	4 Low socio-economic status 36 mos.	5 High risk 4-5 yrs.
Child health							
Child hat a regular source of medical care		-0.09	-0.11				
Child covered by health insurance	0.24						
Child saw doctor for well-child care in past 6 month	-0.34	0.16	-0.28	0.02	0.09		
Child was fully immunized		0.11	0.15	-0.14	-0.12		
Child treated for illness in the past year		0.27	0.12	-0.04	0.01		
Child treated for injury in the past year	-0.28	-0.14	-0.35	-0.04	-0.24		
Child went to the emergency room past year	-0.30	0.21[b]	-0.05[b]	-0.11	-0.23		
Low birth weight		-0.20	-0.01				
Percentage stillbirths		-2%[a]	-1%[a]				
Parenting							
Parental knowledge							
KIDI[m] (total score)	0.33	0.11	0.06	-0.18	-0.15		
General child development	0.04						
Language/cognitive development	0.31						
Emotional development	0.35						
Discipline	0.06						
Child care and safety	0.20						
Parental attitudes							
PSOC[n] (total score)	-0.17	0.18	0.05	0.01	0.12		
Parenting efficacy	-0.20	0.13	-0.08	0.27	0.35*		
Satisfaction	-0.10	0.15	0.11	-0.22	-0.01		
Parental practices							
HOME[o] (total score)	0.11	-0.10	0.08	0.14	0.14		
Parental responsivity	-0.07	-0.02	-0.07	0.08	0.22		
Acceptance of childs behavior	0.04	0.04	0.30*	-0.23	-0.04		
Organization of the environment	0.31	-0.08	0.13	0.21	0.24		
Appropriate play materials	0.33	-0.29*	-0.07	0.13	0.04		
Involvement with child	-0.14	-0.15	-0.03	0.23	0.00		
Opportunities for stimulation	0.12	0.21	0.21	-0.04	0.12		
Discipline (HOME items)				-0.28	-0.10		
Language/literacy prom. behavior (HOME items)	0.14			0.26	-0.02		
Language, literacy and numeracy prom. (total score)	0.17						
While doing things, parent talks to/asks questions	-0.30						
While … reads aloud to child	0.31						
While … counts, sings, says rhymes/uses numbers	0.26						
Tells stories, says nursery rhymes, sings with child	0.49*						
Looks at or reads books with child	0.01						
Talks to/asks child questions while reading to child	-0.19						
Parent Observation Scale	-0.41						

Table 2. (continued)

Outcome domains	1 Very low income 24 mos.	2a Teenager mothers 24 mos.	2b Teenager mothers (comb. intervention) 24 mos.	3a Spanish speaking Latinas 36 mos.	3b English/bilingual speaking Latinas 36 mos.	4 Low socio-economic status 36 mos.	5 High risk 4-5 yrs.
Parent-child interaction							
NCAST[p] (total score)	0.09						
Parent scale score	0.03						
Child scale score	0.10						
HOME (Parent-child interaction Subscale)	0.18			0.06	0.09		
Prevention of abuse and neglect							
AAPI[q] Average child maltreatment precursor scale	0.18						
Rates of reported opened cases of child abuse		-0.08	-0.31*				
DSS[r] and school records							
Confirmed cases							0%[a]
Cases remaining open							0%[a]
Current suspected cases							-25%[a]

Note. In the low SES study (No. 4) the authors only mention the effects for psychosocially stressed families, if they are significant. Because this was no longer the case at 36 months, no data is reported anymore (nr.).
[a]If the effect size was not reported in the study, we calculated for this compilation Hedges' *g*. Where percentage point change was reported, the effect size calculated is the difference between the intervention and the control group. [b]Mean effect size for injury and illness. [c]Bayley Scales of Infant Development (BSID). [d]Developmental Profile II (DPII). [e]Kaufmann Assessment Battery for Children (K-ABC). [f]Peabody Picture Vocabulary Test (PPVT). [g]Systematic Analysis of Language Transcript (SALT). [h]Test of Early Reading Ability-2 (TERA-2). [i]Adaptive Social Behavior Inventory (ASBI). [j]Bayley Behavioral Rating Scale (BBRS). [k]Social Skills Rating System (SSRS). [l]Denver Developmental Screening Test. [m]Knowledge of Infant Development Inventory (KIDI). [n]Parenting Sense of Competence (PSOC) Scale. [o]Home Observation for Measurement of the Environment (HOME). [p]Nursing Child Assessment Satellite Training (NCAST) teaching scale. [q]Adult-Adolescent Parenting Inventory (AAPI). [r]Department of Public Health and Social Services (DSS) Statistics.
*p < .05 **p < .01

5.3 Effects in specific risk groups

Comparing different risk groups, children from immigrant Spanish-speaking families (No. 3a) and the high risk sample (No. 5) benefit the most. Children from these two multiply stressed risk groups showed majoritarian consistent effects in the desired direction in all developmental domains examined, sometimes substantively and/or significantly. This suggests that the Spanish-speaking Latina mothers are more involved and provide their children with a greater abundance of language-related support than the mothers in the control group, whereas in other parenting areas, the effects are weak or inconsistent.

By contrast, adolescent mothers and their children from the PAT group seem to benefit least. PAT parenting education was unrelated to many aspects of child development in this subgroup. By contrast, a significant effect was established in terms of the prevention of abuse and neglect; in all other areas investigated, the effects were either very small or inconsistent.

6. Review discussion

Following up the research questions, in a first step the effectiveness of PAT with at-risk families is summarized and embedded in the greater context of research. In a second step, the effectiveness by virtue of program implementation is discussed. Finally, limitations are examined to discuss conclusions for further research.

6.1 Evidence of effectiveness in at-risk families

From the description of program implementation, it is clear that the studies are different from each other in terms of structural and process quality. Thus, drawing an *overall conclusion* is somewhat challenging. The majority of the results in the outcome domains show, however, slight and in isolated cases substantively important effects predominate that are rarely of statistical significance. The extent to which the effects have an impact varies in accordance to the various different studies or risk groups and the outcome domains. The effects in the area of child development and with children from multiply-disadvantaged families are largely consistent and clear.

So what do these effects actually mean? The fact that only a few of the PAT effects observed are of statistical significance can undoubtedly be attributed to the too small sample sizes to provide evidence for slight effects. None of the studies, for example, attained the optimal sample size for proving significantly slight effects (Bortz & Döring, 2006). As to the *practical significance*, the magnitudes of the effect sizes should be interpreted in the context of the interventions being studied (Hill et al., 2008). Various reviews and meta-analyses on the effectiveness of home visitation programs show a heterogeneous picture with differing effects. With a few exceptions, most programs

rarely show effects exceeding 0.20 of a standard deviation in size in high-quality research studies (Bull et al., 2004; Gomby, 2005; Mathematica Policy Research, 2013). Hence, the effects from PAT in at-risk families reflect the findings on the effectiveness of other parenting education and home visitation programs, where PAT is one of the thirteen best evaluated programs (Mathematica Policy Research, 2013). Nevertheless, the literature (Gomby, 2005; Olds et al., 2007) is largely unanimous in that only few visitation programs do yet satisfy stringent effectiveness standards, such as those worded, for example, by the Society for Prevention Research (SPR) (Flay et al., 2005).

Cost-benefit analyses are also of major importance for the consolidation and establishment of intervention programs. Current estimates indicate that PAT has a positive cost-benefit-ratio and returns over 1.23 USD per dollar invested – although other high quality home visitation programs, such as the Nurse Family Partnership, in some cases, feature a better cost-benefit-ratio (Aos, Lieb, Mayfield, Miller, & Pennucci, 2004; Karoly, Kilburn, & Cannon, 1998).

6.2 Effectiveness and program implementation

There is empirical support to the conclusion that the quality of implementation affects the outcomes obtained (Durlak & DuPre, 2008; Meyers, Durlak, & Wandersman, 2012). This section therefore will discuss how the implementation factors of PAT relate to the outcomes in at-risk families.

6.2.1 Links between process quality and outcomes

Across the results of home visitation studies, there is one consistent finding: every home visitation program has difficulties offering high quality services (Gomby, 2005), PAT being no exception. Regarding process quality, quantitative aspects of *program fidelity*, such as program intensity and/or duration, were mostly not achieved. As regards qualitative aspects, data are only available from one study, so that the extent to which PAT was implemented true to program is largely unclear. The limited program fidelity and partly *high attrition* (see Table 1) also indicate low parental *participation*, which is crucial for the success of home visitation programs (Gomby, 2007). Similarly, further analyses of PAT indicate a positive correlation between *intensity* and program outcomes in some of the examined risk groups (Wagner et al., 2001). These findings mirror other overviews that likewise point to a positive association between the intensity and impact of the program (Bull et al., 2004; Gomby, 2005; Nievar et al., 2010). Moreover, in other studies on PAT there was evidence of a significant correlation between the *length of participation*, school readiness (Pfannenstiel, Seitz, & Zigler, 2002; Zigler et al., 2008) and third grade achievement (Zigler et al., 2008). Against this background and considering findings from implementation research (Durlak & DuPre, 2008) it seems clear that the failure to satisfy conceptual requirements and the somewhat low participation in studies 1 through 4 leads to reduced measurable effectiveness of the program.

The low participation raises the issue of the *match between program approach and family needs*. The data to hand do not provide a conclusive answer: the level of *engagement* measured in two studies indicates a high degree of acceptance by the participating families and a lower degree of acceptance by the dropouts (Wagner et al., 1999; Wagner et al., 2001). Families would therefore seem to leave the program ahead of schedule if it is not important to them. Nevertheless, dropping out is not necessarily due to a low degree of acceptance: parents may lack the time for house visits if they both work, or may both leave town and be out of contact (Wagner et al., 1996; Wagner et al., 1999; Wagner et al., 2001). Hence, further research needs to be conducted regarding the possible gap between program approach and family needs. Moreover, there is no data on program reach, i.e., the relationship between eligible families and families actually reached (Jungmann & Brand, 2012).

6.2.2 Links between structural quality and outcomes

Structural factors such as *features of the family* are connected to outcomes and are also shown by the increased effectiveness of PAT in multiply disadvantaged families. Moreover, in the two studies that examine the risk groups as subsamples (Wagner et al., 1999; Wagner et al., 2001), more significant effects in the desired direction can be discerned in the at-risk groups than in the full samples (Mathematica Policy Research, 2013). This finding can be interpreted such that PAT is more effective in at-risk families than in those that are less at-risk. Furthermore, risk factors are also related to *parental involvement*, even if there is no single profile of an uninvolved parent (Wagner et al., 1999; Wagner, Spiker, Gerlach-Downie, & Hernandez, 2000; Wagner et al., 2001). Finally, psychosocially disadvantaged mothers benefit particularly well from their own engagement (Wagner et al., 1999).

Connections between *features of the home visitor* and outcomes were observed in the full sample of study no. 3, without, however, any coherent pattern becoming evident (Wagner et al., 1999). In a more detailed qualitative analysis of study no. 3, the authors conclude that the generally weak outcomes are connected to the fact that home visitors emphasized their social support role and placed minimal emphasis on changing parental behavior (Hebbeler & Gerlach-Downie, 2002). Other studies on home visitation and early interventions indicate inconsistent effects concerning features of qualification and outcomes (Jungmann & Brand, 2012; Korfmacher et al., 2008; Nievar et al., 2010). It is clear, however, that the qualification and competence of the home visitors are important for program success, particularly when working with at-risk families. For example, study results reveal that home visitors were not always willing or able to identify and respond to risk factors and that they felt ill-prepared to address risk factors for child maltreatment (Gomby, 2007).

Ultimately there are reasons to believe that in *combination with other child-focused interventions*, PAT unfurls a more profound effectiveness. The effects were greatest in study no. 5, where the children also attended Headstart and pre-kindergarten classes after PAT. In other studies on PAT, there was also a greater effect on school readiness (Pfannenstiel et al., 2002; Zigler et al., 2008) and third grade achievement (Zigler et al., 2008) when the children were educated in addition to PAT.

The empirical findings on the high degree of effectiveness of combined child and parent-focused measures would thus seem to be confirmed (Blok et al., 2005; Brooks-Gunn & Markman, 2005; Gomby, 2005). Furthermore, they emphasize the importance of considering the potential effects of concurrent or subsequent supportive services for children and families.

6.3 Limitations and conclusions

To date, the findings on the effectiveness of PAT in at-risk families have not been systematically reviewed. This study shows that only a few of the evaluation studies of PAT satisfy higher standards of research methodology, so that ultimately five studies shape the foundation for the research review of at-risk families – a small and somewhat inconsistent database. In all, up to the fifth year of life, PAT shows slight and, in isolated cases, substantively important effects that are rarely of statistical significance. There are indications that children from multiply stressed families benefit the most in terms of cognitive, social, and communication/language development and that follow-up processes in the form of child-centered measures can reinforce and lengthen the effects. Nevertheless, there are limitations concerning the outcome areas studied and research methodology. To close these gaps the following conclusions for future research on PAT are outlined:

- *Evidence of effectiveness in at-risk families:* Findings of small effect sizes and insufficient statistical significance in determining effectiveness should not be perceived as evidence of ineffectiveness; what is needed is additional quality research with a longitudinal orientation and adequately sized samples in at-risk families. The need for sufficient sample sizes is even greater to usefully examine different at-risk subgroups, rare situations, such as the prevention of abuse and neglect, and for assessing the possibility to improve medium and long-term chances at school, which is the overriding objective of early intervention by means of PAT (Parents as Teachers National Center, 2011a, Parents as Teachers National Center, 2011b). There are studies that prove the medium-term outcomes of PAT in families living in poverty (Pfannenstiel et al., 2002; Zigler et al., 2008) in kindergarten and third grade, yet these do not satisfy higher standards of research methodology. It is important to close this gap, not least because criticism generally abounds of the lack of research on long-term effects of early care and education. Another central objective is to improve parent-child relationships. The quality of interaction has only been targeted for video-based examination in one study (Wagner et al., 2001). Consequently, in this area more research is needed. Further attention should be paid to the risk groups themselves, which are defined by isolated demographic factors, such as ethnicity, age, and income. To be able to deliver reliable and more precise statements concerning risk constellations, (1) a systematic review of risk and protec-

tive factors must be combined with an assessment of how and to what degree a risk constellation exists within the certain families, and (2) replication studies are needed.

- *Effectiveness and program implementation:* Poor internal validity can be assumed because in several studies program specifications were not met or no data on implementation were available. From this, it follows (1) that there is limited comparability and generalizability of study results, and (2) the assumption that the effects are higher when the implementation abides by the scheduled program. Thus, a systematic assessment of quality dimensions of PAT is needed, service quality is the key to effectiveness. The correlation between program implementation and program effects point to both the potential and the fragility of home visitation programs. Against this background it seems worthwhile to explore the mechanisms of impact between features of implementation quality and outcomes and to generate impulses for program development from this.

Regarding evaluation of the effectiveness of PAT in the European area (see introduction), an important unknown factor is whether a program developed in the US is accepted and effective in another cultural environment with different early intervention structures, particularly with regard to the general prevention policy. Unlike the US, many European countries offer universal pre- and postnatal care funded by the public health care system. Further differences are related to staffing, requirements for professional training and/or supervision (Benz & Sidor, 2013). The success of PAT should essentially depend on whether the aforementioned requirements for implementation and evaluation of PAT are applicable to studies of effectiveness in Europe.

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Hard to reach families – A methodological approach to early recognition, recruitment, and randomization in an intervention study[1]

Abstract. Evaluation of early childcare and education (ECCE) programs faces the problem that families who would have a high need for prevention do often not participate in such programs. Moreover, in intervention studies, regular assessments for research purposes and the lack of intervention in the control group reduce participation. Against this background we present a concept for the recruitment of families in psychosocial at-risk situations in a randomized controlled trial (RCT) using the example of the ZEPPELIN 0-3 project. Results show that the projected number of 252 recruited families was reached and that randomization was successful regarding crucial characteristics.

1. Introduction

According to the results of international comparisons of educational attainment such as PISA, schools are still contending with the problem that educational success is largely a matter of social origin (European Agency for Development in Special Needs Education, 2010; OECD, 2010). For this reason, numerous OECD countries fall back on programs for early child care and education (ECCE) that systematically target a deprived population as defined by social, economic, cultural or psychological criteria (Eurydice, 2009). Particularly in English-speaking countries, there is a great deal of experience in practice and research in this field, which is well documented by the many reviews and several meta-analyses on the effectiveness of ECCE. This research has shown heterogeneous results, but the majority of recent ECCE programs have had considerable positive short-term effects and somewhat smaller long-term effects on child development (Anderson et al., 2003; Barnett, 1998; Burger, 2010; Gomby, 2005; Melhuish, 2004; Mitchell, Wylie, & Carr, 2008; Olds, Sadler, & Kitzman, 2007; Siraj-Blatchford, 2004). More recently, several ECCE projects within the framework of early prevention and intervention have also been launched in German-speaking countries. These projects are now well established and being consolidated (Cierpka, Stasch, & Gross, 2007; Renner, 2011; Stamm et al., 2009; Ziegenhain & Künster, 2012). Initial results show positive effects of early intervention services for families in psychosocial at-risk situations (Ayerle, 2012; Böllert, Buschhorn, & Karic, 2012; Bovenschen et al., 2012; Buschhorn, 2012; Diez Grieser & Simoni, 2011; Renner, 2012; Sidor, Kunz, Eickhorst, & Cierpka, 2013; Tschumper et al., 2012; Ziert, Kurtz, & Jungmann, 2010).

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Upon examination of the effectiveness of prevention programs, it is often found that the targeted population group with a strong need for prevention only rarely participates. This prevention dilemma is especially obvious in families in psychosocial at-risk situations. Different studies document a high self-exclusion rate in socially, educationally and economically disadvantaged families – even if aid work takes place in the homes of the families (Barnes, MacPherson, & Senior, 2006; Heinrichs, Bertram, Kuschel, & Hahlweg, 2005; Murray, Woolgar, Murray, & Cooper, 2003). Concerns about the participation in early interventions can have many causes: misperceptions about the program, intrusion of privacy, lack of trust in service providers, feeling vulnerable, wanting to cope without help, or feeling that the support offered does not meet the specific needs (Barlow, Kirkpatrick, Stewart-Brown, & Davis, 2005; Barnes et al., 2006; Heinrichs et al., 2005). Intervention studies create additional stresses, given that parents have to engage in research assessments and reveal private data. Moreover, in studies using a control group, only some families benefit from the intervention. In experimental study designs with randomized allocation to either group (randomized controlled trial – RCT), it is still unclear whether the family will get support or not by the time they give consent for participation. Thus, not only the characteristics of the intervention, but also the characteristics of the research or research design may obstruct preventive measures and prevention studies. For these reasons, results of randomized studies may be applicable only to families in at-risk situations willing to participate and agree to random assignment (Stronach, Toth, Rogosch, & Cicchetti, 2013; Ziegler, 2010).

Apart from self-exclusion, in some German-speaking studies families with lacking language skills (i.e., in German) were explicitly excluded due to practical considerations (Laucht, Esser, & Schmidt, 1997; Sidor et al., 2013). Also, families with a migration background were not explicitly approached and were therefore underrepresented in the sample (Maier-Pfeiffer, Kurz, Brand, Hartmann, & Jungmann, 2013). However, migrant families are an important target group for ECCE prevention programs, because they are to a greater extent affected by social and health-related disadvantages and, at the same time, less integrated in existing supportive structures (Maier-Pfeiffer et al., 2013).

The systematic non-inclusion of families in psychosocial at-risk situations has substantial consequences. First, it contradicts the purpose of reaching *every* child and to support those families with the highest need for prevention (Jungmann & Brand, 2012). Second, the effectiveness of an intervention cannot be evaluated conclusively, if families with a high need for support are underrepresented in the study sample.

The families described above, who are not easily accessible for prevention and research, are often labeled as “hard to reach”. This is a contested and ambiguous term from the field of social and health care. “Hard to reach” implies that the core problem is the low accessibility of the group and not the recruiting strategy used by researchers (Brackertz, 2007). Therefore, it is important to define means by which families with high need for support can (a) be motivated to participate in early

interventions, (b) participate in a research program and (c) accept the possibility of not receiving support. The goal of this paper is to reflect how families in psychosocial at-risk situations were identified, approached, and motivated to participate in a RCT-study.

The investigation of this question is especially important for German-speaking countries, as almost no experimental studies have been conducted there. For example, only one of eleven pilot projects of the "Nationales Zentrum Frühe Hilfen, NFZH" [National Center on Early Prevention] followed an RCT design (Buschhorn, 2012). There are good reasons for this: First, there are ethical concerns, given that only some families receive support (e.g., Bastian et al., 2009). Second, the realization of an RCT-study is highly complex in terms of methodology and in terms of organization, e.g., for agencies depending on continuous caseloads (Torgerson & Torgerson, 2008). Finally, some scholars raise methodological concerns against RCT-studies. That is, RCT are said to be well suited to specify causal relations, but less adequate in examining the conditions and mechanism that explain these causalities (for a critical review, see Shadish, Cook, & Campbell, 2015; Ziegler, 2010).

However, international standards demand RCT for the scientific validation of efficacy and effectiveness (Flay et al., 2005) – despite this 'gold standard' itself being contested. There are also standards by which ethical concerns can be met. For instance, families must always be permitted to use standard health services. Also, programs must be as promising as the existing standard health care (Kindler & Suess, 2010). Based on these premises and the example of project ZEPPELIN 0-3, this paper aims to examine how the aforementioned difficulties can be met; both in reaching families, as well as in the realization of an RCT-study (i.e., methodology and organization). The main focus is the description of the identification, the recruitment, and the randomization of families in psychosocial at-risk situations. From a conceptual perspective, this mainly concerns the planning and realization of the identification and the recruitment of families. From an empirical perspective, the outcomes are of main interest: (1) To what extent was the target group (a) identified, (b) reached, and (c) motivated to participate in the project? (2) To what extent was the random allocation to the intervention group and to the control group successful?

In order to address these questions, we first describe the project ZEPPELIN 0-3. Second, the identification and recruitment methods used, and third, the randomization process will be described and analyzed in the results section. Finally, the outcomes are discussed and consequences for similar research projects are proposed.

2. The project ZEPPELIN 0-3

ZEPPELIN 0-3 is an intervention study offering prevention and early intervention for children who are jeopardized in their development for psychosocial reasons. The study aims to recognize these children at an early age (i.e., shortly after birth) by using an interdisciplinary network (e.g., midwives, physicians). In the long term, the study strives to enhance the educational opportunities of

these children. Specific criteria for psychosocial risk constellations that may jeopardize child development were formulated. If migrant families met these criteria, they were explicitly addressed and included in the study. The project was realized in three study sites located in the canton of Zurich, Switzerland. Family support was realized within the home visiting program „PAT – Parents as Teachers“ (Parents as Teachers National Center, 2011). A trained PAT-parent educator (i.e., pediatric nurses in this study) visits families at their homes approximately two times a month (frequency may vary depending on specific risk constellation) until children are three years old. Additionally, the project offers monthly group meetings. The study examines the effectiveness of the intervention in a longitudinal experimental design. Families were randomly assigned to an intervention group (IG) and a control group (CG). Only the IG received home-visits and participated in the group meetings. Assessments are performed at an age of 3 months (baseline data) and around the first three birthdays of the children (intervention data), respectively. In this paper, we focus on the recruitment process and baseline data.

3. Identification and recruitment of families in at-risk situations

In order to correctly identify the target group and recruit it into selective preventive measures, the characteristics and potential barriers for participation must be known. Therefore, in this chapter we will – based on the definition of the target group – describe the recruiting protocol, the early recognition of risk constellations and related research issues.

3.1 Early recognition of families in at-risk situations

The target group of ZEPPELIN 0-3 consists of families in at-risk situations. Risks refer to variables that increase the incidence of negative or undesirable developments. Psychosocial risks, such as parents' low educational status, poverty, conflicts among the parent couple or mental illness of a parent can restrict family interactions and conditions for stimulation in such a way that the child lacks the basic social and cognitive stimulation required for optimal development (Belsky, 2008; Bradley, Corwyn, Burchinal, McAdoo, & Garcia Coll, 2001; Bradley, Corwyn, McAdoo, & Garcia Coll, 2001; Hoff, 2006; Lemelin, Tarabulsy, & Provost, 2006; Sroufe, Coffino, & Carlson, 2010; Ziegenhain, 2007). As a result, these children are poorly prepared for school, more likely to repeat grades, to develop special education needs, and to withdraw from school before graduation (Beck, Jäpel, & Becker, 2010; Duncan & Brooks-Gunn, 1997; Hammond, Linton, Smink, & Drew, 2007; Huffman, Mehlinger, & Kerivan, 2000; OECD, 2010; Ramirez-Rodriguez & Dohmen, 2010; Sirin, 2005). Apart from isolated conditions that accentuate the risks, their interaction and accumulation can inhibit a child's development and above all will do so, if the risks and their effects are not absorbed by protective factors (Belsky, 2008; Durlak, 1998; Little, Axford, & Morpeth, 2004).

Based on important risk indicators, we developed a short screening form for the early recognition of families in at-risk situations for ZEPPELIN 0-3 (c.f. Egle, Hardt, Nickel, Kappis, & Hoffmann, 2002; Klein, 2002; Stasch, 2007). It is a simple observation and interview technique with the following four subscales:

- *Personal risks* such as neglected appearance (subjective rating of visual impression), low standard of education (no education after mandatory school), early parenthood (mother younger than 20 years), alcohol and drug abuse, sickness, disability, violence, unwanted pregnancy;
- *Familial risks* such as lack of accomplishment (lack of self-management and planning is evident), single parents, siblings with an age difference of 18 months or less, serious conflicts among the parent couple (close to breakup);
- *Social risks* such as lack of social integration and support (zero or only very few contacts outside the family), dissocial environment (violence, crime, prostitution);
- *Material risks* such as confined living space (less than one room per person), unemployment (one or both parents), financial problems (dependency on welfare, debts).

In addition to these four core risk fields, we recorded child-related risks (e.g., high-risk pregnancy, regulatory problems), as well as other risks, which were not included in the short screening form. Furthermore, we collected protective factors such as stable and reliable parent persons or clear and transparent family structures.

Assuming that a higher hazard is given when several risk factors accumulate, according to our definition, a risk constellation is present, if at least two items from the four core fields apply, while distinct protective factors attenuating these risks appear absent. For example, if there is an adolescent single mother who has good familial support, her risk factors are cushioned by protective factors and this family would not be in the ZEPPELIN 0-3 target group.

For methodical reasons, we defined three more exclusion criteria in addition to the potential protective factors mentioned above. They shall help to keep the sample mortality as low as possible and protect the composition of the intervention and the control group from strongly biasing factors which can hardly be controlled: (1) foreigners without a permanent residency permit, (2) severe illness or disability of the child or of the parents which require hospitalization or long-term treatment so that the families wouldn't be accessible to early intervention, and (3) other ongoing intensive treatments or child protection procedures.

For a more precise investigation during the baseline assessment, the Heidelberger Belastungsskala (HBS) [Heidelberg Stress Scale] was used, which was developed by Stasch (2007) for accompanying research in the German prevention project „Keiner fällt durchs Netz" ["Nobody Slips Through the Net"] (Cierpka, 2009). It assesses dimensions similar to our short screening form:

(1) personal stress of the parents and familial stress, (2) social stress, (3) material stress, and (4) stress of the child. Furthermore, a global estimation of the psychosocial stress is made, on a continuous scale from 0 to 100.

3.2 Recruitment process

For the early recognition and recruitment of the target group around birth dates, an *interdisciplinary network* was established at the three project sites. The regional parent counseling offices (Mütter- und Väterberatungsstellen, MVB) play a key role herein. Those are basic service facilities open to all parents giving low-threshold, cost-free counseling about health-related, emotional, and cognitive development of the child. Each MVB is informed by birth hospitals and the municipal administration about all births in its region of responsibility. The MVB then has to contact the parents and inform about the MVB's offerings and activities. Moreover, the PAT-parent educators are still well connected to these facilities from their previous working fields.

Other involved persons in this network are medical (pediatricians, gynecologists, midwives in the birth hospitals), and psychological professionals (counseling for parents of infants and toddlers, social counseling, psychological and psychiatric services) within the existing community service infrastructures. This network assesses the risk using the short screening form and passes on the contact details of those parents who would be willing to participate in ZEPPELIN 0-3. Three steps make up the recruiting process:

1. Risk assessment using the short screening form: After a personal contact with the families, the *short screening form* is filled out for a first risk assessment. If inclusion criteria are met, the parents are informed about the study. If they are willing to participate or are still not sure, the contact details are forwarded to ZEPPELIN 0-3 and stored in a database. If a family cannot be contacted via the MVB and if there is suspicion of risk (e.g., no father mentioned on the birth record, living in a deprived area, etc.), *additional efforts* are made: the contact details are sent to a PAT-parent educator who tries to make contact with the family via the pediatrician, the social assistance office or by visiting the family at home.
2. Validation and registration for randomization: The PAT-parent educator in charge visits the family at home for the first time, giving more detailed information about the project and the application procedure. Also, she estimates the risk constellation for a second time, trying to ensure that only families in at-risk situations participate in ZEPPELIN 0-3. If the family meets the inclusion criteria and the parents are motivated to participate, they are registered for randomization, and an appointment for the baseline assessment is made.

3. Baseline assessment and information about group allocation: During the second recruiting home visit, research staff, accompanied by PAT-parent educators, assess the baseline data, sometimes supported by an intercultural interpreter. After that, the family is informed about their group allocation, which is the last step of the recruiting procedure.

Aside from recruitment via the interdisciplinary network, interested families can also apply for ZEPPELIN 0-3 themselves. Most of these families have heard about the project by word-of-mouth recommendation or pamphlets. These families also undergo a risk assessment using the short screening form. If they meet the inclusion criteria, they also undergo the recruitment steps 2 and 3 mentioned above.

3.3 Research in families in at-risk situations

The psychosocial risk constellation contributes to the difficulties in reaching the target group by the usual written research methods and instruments, e.g., questionnaires. Self-management skills (e.g., returning the questionnaires after completion) may be reduced in these families, as well. Moreover, families with insufficient language skills and/or migration background are overrepresented in the sample (see section 5). Thus, the data collection has to be culturally sensitive and low-threshold (Lanfranchi, 2012). Practically, this means that

- if practicable, data should be collected by the researcher during home visits to realize a high as possible response rate. If needed (e.g., no time during the home visit) parents can answer the questionnaires after the home visit and return them by a self-addressed postage-paid envelope.
- for non-native speakers with insufficient German language skills, researchers are assisted by female intercultural interpreters. Also, the questionnaires are translated into the languages most needed (i.e., Albanian, Portuguese, Turkish, English) and linguistically validated by an external translation office. For other languages, the interpreter translates the questionnaires orally during the home visit.
- for the control group, an incentive system is established (i.e., greeting cards, small birthday presents, and monetary benefits) in order to keep up their motivation and commitment. According to Heinrichs, Krüger, and Guse (2006) the results of the study should not be negatively influenced by this.

4. Procedure of allocation to the intervention or the control group, respectively

The following section gives an introduction into the aims and methods of the randomization and describes how it was done in the ZEPPELIN 0-3 study.

4.1 Purpose and facets of the randomization

It is crucial for experimental studies (RCT's) like ZEPPELIN 0-3 that the allocation of the participants to an intervention and a control group is strictly random. This random allocation may not avoid group differences regarding specific or unspecified variables, but such potential differences are covered by the statistical risk of error and statistically significant group differences can be attributed to the group allocation or the intervention, respectively (e.g., Schumacher & Schulgen-Kristiansen, 2008).

S*imple randomization* is a process sequentially leading to an allocation to either intervention or control group with each participant having the same chances to end up in either group, independent of other participants' allocation (e.g., a coin toss). Here it is guaranteed that the allocation of each subject cannot influence the next subject's allocation, and there is no better method than this simple randomization regarding the prevention of bias (Schulz & Grimes, 2007). However, it usually leads to different sizes of the sub-samples and they may inadvertently differ substantially regarding their composition, e.g., in age or nationality. Different sample sizes affect the efficiency of the study, group differences lead to evaluation and interpretation problems and can endanger the validity of the study. To avoid the first problem, *block randomization* is an accepted means, the second problem can be minimized by stratification of data.

Block randomization divides the sequence of allocations to be made into different blocks. If the IG and the CG shall be of the same size, one half of each block is allocated to each group. The sequence of the subjects within each block is strictly random. In order to avoid the predictability occurring possibly during the last steps within each block, blocks of different size can be used in random order. Different group sizes only occur if the last block in the whole procedure is not fully exploited.

During *stratification,* an independent sequence of allocations is built for each characteristic that shall be controlled for (e.g., gender). If more characteristics are important (e.g., gender and nationality), an independent sequence is built for each combination of their values.

Stratification and block randomization can be combined in order to avoid both problems mentioned above, i.e., stratified block randomization.

4.2 Randomization in ZEPPELIN 0-3

For the randomization in ZEPPELIN 0-3, the following assumptions and aims are relevant:

- The births occur over the course of one year – the subjects (families with newborns) have to be allocated to either group (IG/CG) in an ongoing process.
- The target sample size is $N = 252$ (IG 132/CG 120). The IG is defined to be slightly larger (i.e., 10%) so that more families can benefit from the intervention without severely influencing the statistical power of the study.
- The group allocation has to be realized strictly randomly (randomization). IG and CG should not differ considerably regarding selected characteristics.
- For the staff involved, the decision about the allocation of a subject shall not be predictable, e.g., inferred from previous allocations. This unpredictability prevents the probability of allocation from being influenced by the order of assignment for randomization.

On to these assumptions, a stratified block randomization was realized. Stratification aspects were:

a. Location of the project (i.e., three toddler counseling centers in the agglomeration of Zurich)
b. Risk (i.e., high: ≥ 3 items in the short screening/low: ≤ 2 items) taking into account any protective factors, see section 3.1
c. Family structure (single parent: yes/no)
d. German language skills (needs translation: yes/no)

These stratification characteristics were selected because they were assumed to have a severe influence on child development and/or the implementation and efficacy of the intervention. Ad (a): stratification according to project location is particularly important. On one hand, there should be an internally even distribution of IG and CG so as to control for potential differences of the three teams' interventions. On the other hand, the workload of each team needs to be managed. The project locations correspond to study centers in multicenter studies, which are seen as an important stratification characteristic (e.g., Schumacher & Schulgen-Kristiansen, 2008). Ad (b): the influence of psychosocial risks on the development of infants and toddlers has already been described in section 3.1. Ad (c): family structure has been considered because the mutual support in the relationship as a couple has been found to be one of the most important social resources in the transition to parenthood (Belsky, 2008). Ad (d): insufficient local language skills and underlying cultural differences cannot only impair educational success, but also influence the research process and data collection (e.g., translation of the instruments, assistance by intercultural interpreters) and therefore have to be taken into account, as they endanger the validity of the results.

Using these stratification characteristics, there are 3 (project location) x 2 (risk) x 2 (family structure) x 2 (German language skills) combinations of values. For all 24 possible combinations, a random sequence of allocation is designed. Each of these random sequences is composed of blocks of 2, 4, or 6 allocations each, and these blocks shall occur with a probability of 6/11, 4/11 or 1/11, respectively. The order of the blocks varies randomly, and within each block, one half of the subjects are allocated to the IG or CG in random order. Such a table of 34 random sequences, allocated to the stratification characteristics, was produced in SPSS by an external statistician who was not involved in the data collection and then handed to a responsible person outside the ZEPPELIN 0-3 team, in the form of an excel spreadsheet. This person has no other information about the families and is only involved in the project for this single task of allocation to groups.

4.3 Randomization procedure

1. The PAT-parent educators send an application form for each participating family to the responsible person mentioned above, including the family's case number and their stratification characteristics which are relevant for the randomization.
2. The responsible person identifies the relevant random sequence on the basis of the stratification characteristics and allocates the family to the first open position in this sequence to IG or CG. In order to have a larger IG group, he allocates every 50th family to the IG, no matter what the table would say.
3. The responsible person sends the result of the randomization (i.e., the group allocation of this family) to the PAT-parent educator, in a sealed envelope.
4. After the baseline assessment by the researcher and the PAT-parent educator, the families are informed about their random allocation.
5. The recruitment and randomization process is stopped at each of the three project sites as soon as the targeted number of families – with replacement of early dropouts – is recruited. In order to approximately realize the planned division into IG and CG, the remaining one to three cases per project site are allocated to the incomplete group by hand. Since these few families are the next families in the sequence anyway, and are not selected according to specific characteristics, the allocation is still in concordance with the randomization protocol.

5. Results

Could the families be identified according to the described procedure and motivated to participate in ZEPPELIN 0-3? Also, was the randomization successful; are the IG and the CG similar in their core characteristics? To address these questions, we will describe the selection processes during the

recruitment procedure, the risk constellation of the families, and the reach of the program. Then we will compare the IG and the CG regarding relevant features.

5.1 Identification and accessibility of the target group

The goal of including N = 252 families in psychosocial at-risk situations in the study sample could be reached according to the recruitment protocol defined in section 3.2. In the following, we describe to what extent and who within the interdisciplinary network helped to reach families in psychosocial at-risk situations and how the selection process was carried out (see Figure 1).

1. Risk assessment with the short screening form: During the year of the recruitment phase (September 1st 2011–August 31st 2012), 587 families potentially at-risk were identified and entered in a database. Thereof, four families applied by themselves, the others were transferred to the heads of the local study centers via the interdisciplinary network. Most families were recruited by the MVB (nursing consultants). 227 families could not be contacted by the MVB, so additional effort by the PAT-parent educators was necessary. 50 families (22%) of these hard-to-reach families could finally be motivated to participate. 24 families still could not be contacted; it remains unclear if they really were families in at-risk situations and if they would have participated in ZEPPELIN 0-3.
2. Validation and application for randomization: After applying at ZEPPELIN 0-3 (data is saved in the database), the sample size decreased to 269 before the baseline assessment. 162 families who met the inclusion criteria but refused to participate constitute the biggest group of these non-responders. Other families did not meet the inclusion criteria because of lacking risk (N = 101), lacking stay permit (N = 5), no time for regular participation (N = 9), or they were involved in other ongoing interventions (N = 6). Eleven families moved away; for them a detailed analysis of non-response reasons was not possible.
3. Baseline assessment and information about group allocation: Between the application for the randomization and the information about the group allocation, another 14 families dropped out. Again, the reasons were (a) that they moved away, (b) did not meet the inclusion criteria any more, or (c) refused to participate. We have to add that, for administrative reasons, the baseline assessment of 84 families could only be made after having information about their group allocation. Four families withdrew their consent to participate after they were informed about their group allocation without a baseline assessment, because of lack of time, refusal of participation by family members, not seeing the benefit of their participation or for unknown reasons. These four families have to be considered participants and early dropouts because they had been informed about their group allocation, which might have caused their refusal.

To sum up the recruitment process, out of the 587 families identified having a potential risk constellation, 563 could be reached. 439, that is 78% of the families reached met the inclusion criteria. 171 thereof, i.e., 39%, denied participation. The most frequent reasons were (multiple answers possible) no interest (*N* = 145) and lack of time (*N* = 78). 33 families did not explain their non-response.

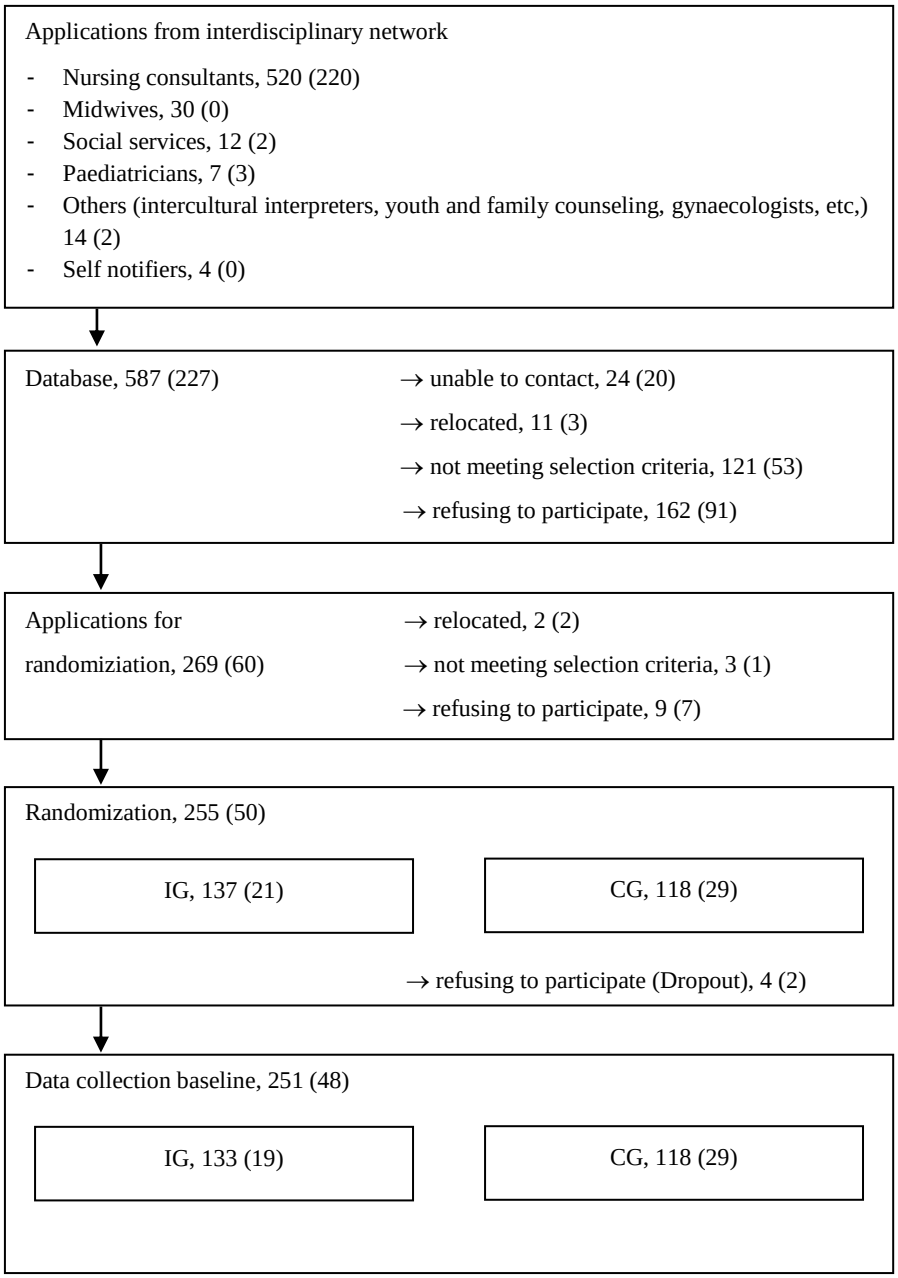

Figure 1. Flow chart of the recruting process including number of families (in brackets: number of families recruited with extra efforts).

5.2 Risk constellation in the target group

The estimated risk of the ZEPPELIN 0-3 families (*N* = 251 at baseline) was rated with the short screening form by the network and verified by the PAT-parent educators. Thirteen risk factors within the four subscales of the short screening form were detected in at least 10% of the families. The most common risks were: lack of social integration (in 65% of the families), lack of support from family or neighbors (48%), insufficient German language skills (47%), financial problems (44%), lack of further education after mandatory school (39%), and confined living space (47%). Unemployment (24%), problems regarding self-management and planning (19%), sickness (15%), two births within 18 months or less (13%), serious conflict among the parent couple (13%), single parent status (12%), and unwanted pregnancy (10%) follow. To estimate the actual risk, it is important to assess the specific constellation of risk factors. For the identification of the risk constellation of the 13 risks a latent class analysis (LCA, e.g., Hagenaars & McCutcheon, 2002) was performed using Mplus 7 (Muthén & Muthén, 2012). The results show three types of risk constellation in the ZEPPELIN 0-3 sample. They are characterized by the frequency of risks per type (see figure 2). The most common type (42% of the families) is characterized by *insufficient local language skills*. All families of this type cannot or only rarely communicate using the local language. Thus they are very often (86%) hardly socially integrated, with only scarce contact to people outside the elementary family. Often they also lack support from the extended family or from the neighborhood. One half of these families additionally have a risk regarding their education and housing situation. Regarding other risks, this type is not very different from the other types.

The second type is defined by *personal risk factors and financial problems*. It consists of 22% of the families. Substantial conflicts of the parent couple, unwanted pregnancy, and single parenthood are found within this type more frequently (approximately 40%) than in the other types. Within this type, the frequency is similar to that of lack of social integration and support. 94% of the families within this type have financial problems, which are noticeably often combined with unemployment and also by constricted room and lack of further education.

The third type is found in 36% of the families. Here, *scattered risks* that occur rather rarely are typical instead of definite dominant risks. Exceptions are sickness and insufficient self-management and planning skills, which occur more often here than in the other types and are as common as the lack of social integration and familial support, which dominates all three types in general.

The three types differ regarding the total number of risk factors from out of the four core fields of the short screening form (see section 3.1). In the third, “scattered”, type it is significantly lower (*M* = 2.68, *SD* = 1.27) than in the “language problem” type (*M* = 4.42, *SD* = 1.29) and in the “personal and financial risk“ type (*M* = 5.46, *SD* = 2.20). Further risks detected by the short screening form, such as birth risks or regulatory problems and problems with breastfeeding etc. add to these risks (i.e., in 30% of families).

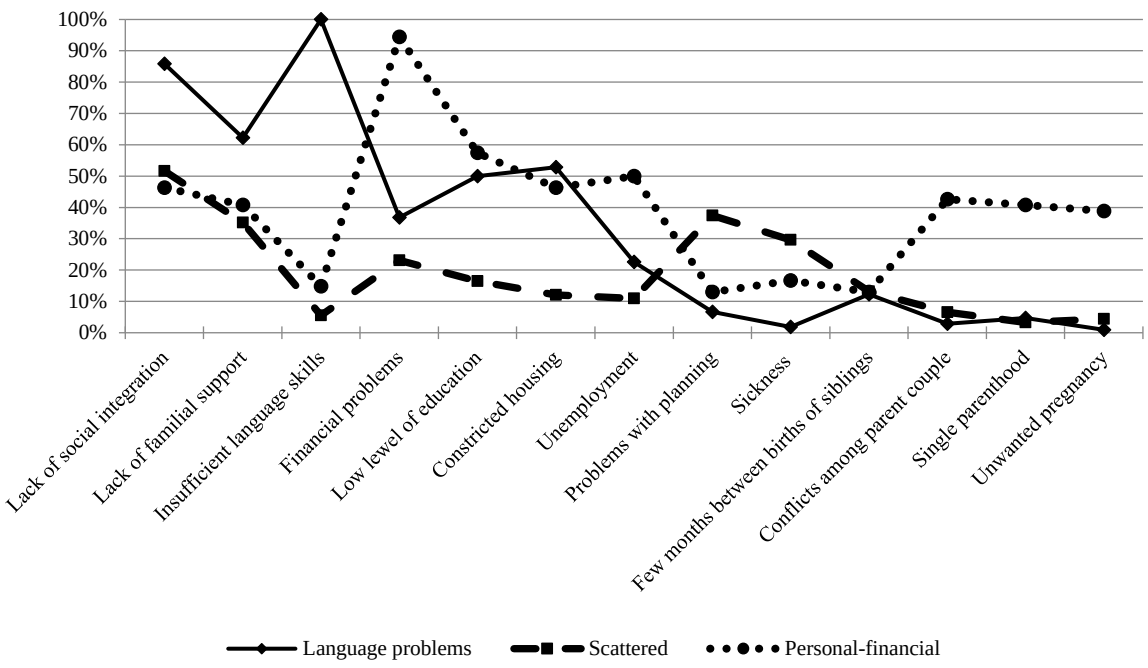

Figure 2. Relative frequencies of risk factors and type of risk constellation.

The short screening form was particularly developed for social or health service practitioners for the assessment of specific risks in a family. For the more precise investigation of the psychosocial stress of the families during the baseline assessment, ZEPPELIN 0-3 researchers used the HBS in a second step. The estimations with the HBS result in psychosocial stress (i.e., HBS score ≥ 40) in 74% of the participating families, indicating their need for support. 24% of the families score between 20 and 39, meaning that stress cannot be compensated in the medium term. Only 1.6% of the families were estimated to have a low stress (i.e., HBS < 20). This means that ZEPPELIN 0-3 identified families with a high stress accurately.

Moreover, certain risk indicators, compared to the population, reveal a higher risk within the ZEPPELIN 0-3 sample. For example, preterm births are overrepresented in our sample compared to the Swiss population (i.e., 6% in Switzerland, no specific data available for the canton of Zurich), as well as children with low birth weight, lower than 2500g (i.e., 11% ZEPPELIN 0-3 vs. 6% in Switzerland) (Bundesamt für Statistik, 2015). Foreign nationals are found more often in the ZEPPELIN 0-3 sample (i.e., 63%) than in the canton of Zurich (i.e., 25%) (Statistisches Amt Kanton Zürich, 2015).

5.3 Program reach

Finally, there is the question of discrepancy between families in at-risk situations and participants in the ZEPPELIN 0-3 project. The reference point are the 2418 children born between July 1st 2011 and August 31st 2012 in the project locations according to the internal census of the cantonal MVB. 446 thereof met the inclusion criteria, which equals 18%. 11% of the newborns, 268 children, were finally included in the sample. This means that 7% of the newborns could not be included in the project, although they were psychosocially in an at-risk situation.

5.4 Results of the randomization

As discussed above, randomization does not avoid differences within the sample between the IG and the CG at baseline. Large, statistically significant differences could indicate possible errors in the allocation process. By analyzing this, it is possible to statistically control for such differences during data analysis. Table 1 therefore compares IG and CG regarding characteristics of the baseline assessment. The table distinguishes between characteristics of the family and characteristics of the child, respectively. This is due to the fact that the sample includes 13 pairs of twins.

Due to stratification, the group differences in certain characteristics should be as small as possible. As can be seen in Table 1, this was successful regarding the study locations. Since the language skills and single motherhood status were controlled for, the groups are similar in these aspects. Regarding the psychosocial stress – assessed with the HBS at baseline – the group differences regarding the different dimensions are also small, whereas they are slightly larger regarding the total score: in the IG the proportion of families with an overall high stress is slightly, but not statistically significantly, higher than in the CG. With respect to characteristics that were not stratified, and among the child characteristics, there are no differences in the number of children born preterm or with low birth weight. In contrast, the number of girls is higher in the IG and there are slightly more foreign nationals in the CG (but not regarding the nationality of the mothers). In the assessed characteristics of the family, i.e., number of twins, parity, financial and housing situation, and occupational status, the differences between IG and CG are not statistically significant. Regarding the mothers' characteristics the group difference of origin and young age is very small, but the IG has slightly higher education. The difference between the number of foreign nationalities of mothers and the mothers' origin is due to the fact that many mothers have Swiss nationality but report a different country of origin regardless.

Table 1. Descriptive characteristics of the sample, baseline assessment (in percent).

		IG	CG	Total	*p*-value[a]
HBS	Family/personal (*N* = 251)	75.2	68.6	72.1	.25
high burden (>= 40)	Social (*N* = 251)	48.1	50.8	49.4	.67
	Material (*N* = 251)	57.9	53.4	55.8	.47
	Child (*N* = 264)	24.3	23.4	23.9	.86
	Overall (*N* = 264)	78.6	69.4	74.2	.09
Family characteristics	Twins	5.3	5.1	5.2	.95
(*N* = 251)	First child	57.9	59.3	58.6	.82
	Occupational status[b]				.78
	ISEI 16-30	37.6	33.3	35.6	
	ISEI 31-40	33.8	35.9	34.8	
	ISEI 41-85	28.6	30.8	29.6	
	Location				.99
	Dietikon	40.6	40.7	40.6	
	Kloten	27.1	26.3	26.7	
	Uster	32.3	33.1	32.7	
Child characteristics	Female	57.1	47.6	52.7	.12
(*N* = 264)	Prematurity	15.0	12.9	14.0	.62
	Low birth weight (< 2500 g)	10.7	10.5	10.6	.95
	Foreigners (nationality)	58.6	67.7	62.9	.12
Mother characteristics	Single parents	12.9	14.4	13.6	.73
(*N* = 251)	No compulsory education	11.5	15.2	13.2	.39
	No post-compulsory education	31.6	36.8	34.0	.38
	Little local language skills (German)	32.3	28.8	30.7	.55
	Foreigners (nationality)	72.9	72.9	72.9	.99
	Foreign country of origin (self-report)	85.7	85.5	85.6	.96

[a]*p*-value of a χ^2-test between group membership and the corresponding variable and with appropriate df's. [b]*Socio-economic Index of Occupational Status* (ISEI) was derived from parents' occupational status according to the *International Standard Classification of Occupations* (ISCO 88(COM)).

6. Discussion

Based on the research questions, we will discuss the success of early recognition, accessibility of the target group, recruitment and randomization of the families in at-risk situations.

Via the interdisciplinary network, a total of 439 families with 446 children were identified who met the inclusion criteria, corresponding to 18% of all births in the project locations. Thus, these numbers are within the expected range of 15-20% of families in at-risk situations in the project locations (Neuhauser et al., 2014). The description of the three dominant risk constellations shows that risks accumulate in different types, resulting in a heightened risk, especially in the "language problem" type and in the "personal and financial risk" type. The detailed psychosocial stress assessment with the HBS shows that out of the participating families approximately 75% have an overall stress that would legitimate early prevention and intervention and that only 2% of the families have a low stress. Finally, the comparison with the population in some variables indicates that families in the sample have more stress than the average population. Thus it can be assumed that ZEPPELIN

0-3, with its different assessment methods, identified families in at-risk situations. We have to admit that the first screening in the interdisciplinary network identified 121 families in at-risk situations who in a more detailed evaluation did not meet the inclusion criteria. This underlines that for a careful risk assessment, a careful investigation in the families' home environment context is necessary.

The families were recruited mainly via the existing psychosocial community service infrastructures and more specifically, most families were recognized by the MVB. We already had expected this, because the MVBs are informed about all births in their regions of responsibility and the PAT-parent educators are well connected in this working field since they are trained parent counselors. According to an internal statistic the MVBs reach about 79% of the families with a phone call. In contrast, it was more difficult to motivate the staff from the health care services to actively collaborate in the recruitment process. But we received several applications from pediatricians and family physicians after the recruitment was finished. This could indicate the need of an extended preparatory period in the establishment of instruments and processes for the assessment of psychosocial risks.

In the set-up of the interdisciplinary network, ZEPPELIN 0-3 had pursued the goal that no family "slips through the net". Despite profound efforts on different levels of the system ZEPPELIN 0-3 did not succeed in personally contacting all families in at-risk constellations. 24 families could not be reached, 11 families moved away, so a detailed risk assessment was impossible for them. On the other hand, it can be emphasized that out the 587 families with potential risks, 552 (94%) were reached, 50 thereof thanks to additional efforts by the PAT-parent educators. These numbers show that ZEPPELIN 0-3 was successful in establishing a new level of approaching hard-to-reach families (Lanfranchi & Burgener Woeffray, 2013). They also show, however, that families in at-risk situations cannot be recognized and motivated to participate in an intense early intervention program or evaluation study via the existing infrastructures, even if additional efforts are made. With this additional effort regarding hard-to-reach families, the targeted number of 252 families could be recruited in ZEPPELIN 0-3. It was a problem that 162 families who met the inclusion criteria refused to participate for reasons, which are already known from other studies (e.g., like no need for support, no time). Other studies, however, also found that often these are only excuses for the real reasons such as feelings of timidity or concerns about being controlled externally (Lanfranchi, 2014). Whether this also applies to these families in ZEPPELIN 0-3 cannot be answered. It also remains unclear to what extent the participation in an RCT study and the surrender of private information, as well as not knowing at the beginning whether the family would get support or not, were barriers for participation. It remains a great challenge to convince families of the benefits of preventive programs and the participation in an RCT study.

Our randomization protocol guarantees a strictly random allocation to IG and CG and ensures unpredictability of the allocation by the staff involved in the application process. With 34 random sequences for 251 decisions however, differences between the groups in a stratification criterion can

still occur. This disadvantage should not be overvalued, since the probability of severe group differences is at least minimized. In a random procedure, it can still happen that not all the important characteristics can be controlled for, since the allocation is random. The procedure conducted has the advantage that it ensures a certain balance (combination of stratification criteria) also in subgroups. Moreover, it could be developed before the study began and realized during the recruitment with our administrative resources.

With respect to the total sample size, it is unproblematic that the two groups (i.e., IG and CG) are not the same size (e.g., White & Freedman, 1978). The comparison regarding basic characteristics shows that the two groups are, as expected, not perfectly balanced, but are not significantly different either. Variables with measurable differences will be controlled in future analyses.

7. Outlook

Results and discussion show that the recruitment goals of the ZEPPELIN 0-3 project could be reached. Thus, the question arises how these experiences regarding identification, recruitment, and randomization could be applied by other intervention studies.

Generally, the described methods can be adapted to other projects. A central challenge regarding data collection is to motivate the different persons involved in the psychosocial and health care infrastructures with their particular and practical interests to cooperate in research. Accurate document identification, recruitment, and randomization is only possible with their help. The effort for preparation (e.g., training) and implementation of the project (e.g., documentation of the recruitment efforts, even for families who could not be reached, data management, meetings, etc.) is huge and should be taken into account already in the planning stage of the project. Accurate data documentation and an adequate supervision is necessary, especially when the project starts and the workload is high due to structures and processes being implemented.

For the early recognition of families in psychosocial at-risk situations, the implementation of an interdisciplinary network is essential. However, it requires some time until the processes are established and work well, as can be seen with the medical staff in the ZEPPELIN 0-3 processes. Thus, there should be enough time for the recruitment phase, and it should be extended if necessary. Otherwise inclusion criteria could possibly become somewhat loose, so that families end up in the sample who do not meet the inclusion criteria.

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Predictors of maternal sensitivity in at-risk families[1]

Abstract. Maternal sensitivity is of central importance to a child's healthy development. This study examines how different types of psychosocial stress originating from the child, the parents, the context, and overall stress relate to maternal sensitivity. Psychosocial stress and its impact on maternal sensitivity are assessed in an at-risk sample of 248 mother-child dyads in the first half year of life. The cross-sectional study was realized as a part of the ZEPPELIN project in the canton of Zurich, Switzerland. Results show, first, that maternal sensitivity decreases with increased amounts of overall stress. Second, lack of social support and low maternal education is associated with reduced maternal sensitivity. Finally, reduced sensitivity is associated with the combination of severe material and parental/familial stress. In contrast, child stress indicators appear to have a weaker association to maternal sensitivity. Implications of these results for practice are discussed.

1. Introduction

A child's early experiences with its primary caregivers are fundamental to its development (Brazelton & Greenspan, 2000; Bronfenbrenner & Morris, 2006). If parents succeed in making these interactions sensitive, a positive impact on the development of the child and a lower likelihood of childhood disorders is to be expected (Sroufe, Coffino, & Carlson, 2010). In contrast, problematic forms of interaction, such as intrusive-hostile or negligent behaviour, increase the vulnerability to socioemotional and cognitive problems (Bradley & Corwyn, 2007; Field, 1994; NICHD Early Child Care Research Network, 1999; Sroufe et al., 2010). Although parental interaction skills are of great importance to the development of the child, research has been concerned primarily with the study of components and consequences of parental behaviour. In contrast, the study of conditional factors, that is, the question of why parents behave in a certain way, has been neglected for a long time. Especially risky conditions for parenting, in particular the accumulation and interaction of various types of psychosocial stress and their relation to parental interaction skills, have been studied only rarely (Belsky, 2014; Ciciolla, Crnic, & West, 2013). Therefore, the present study focuses on psychosocially stressed mothers of infants in their first half-year of life. The aim is to contribute to a better understanding of early interaction processes and their determinants. Particularly endangering stress constellations should be identified, thus creating a basis for prevention and intervention.

1.1 Maternal sensitivity

In the last two decades of the twentieth century, attachment theory has established itself in the study of dyadic parent-child interactions, and with it, the concept of maternal sensitivity as an important

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predictor of maternal-infant attachment. Attachment is precisely important because of its role in the initiation of complex developmental processes as an organizing core (Sroufe, 2005). Longitudinal studies indicate that secure attachment beneficially influences children's later social-emotional functioning and cognitive performance and that children with a secure attachment are more capable of developing and maintaining successful close relationships, particularly with their parents and peers (Moss et al., 2011; Sroufe, 2005; Thompson, 2008; West, Mathews, & Kerns, 2013).

In attachment theory, both early maternal sensitivity and the continuity in sensitivity are important for the child's future development (Belsky & Fearon, 2002; Bowlby, 1969). Sensitivity is understood as the ability of the mother to perceive the signals of her child and to interpret, and promptly and appropriately respond to them (Ainsworth et al., 1978). This definition is widely received in research. At the same time, the sensitivity concept was further developed into a construct that represents various forms of parental interaction behaviour (Claussen & Crittenden, 2000; Halle, Anderson, Blasberg, Chrisler, & Simkin, 2011; Nicholls & Kirkland, 1996). Despite this broad operationalization of the construct, numerous studies show that maternal sensitivity is an important predictor of secure maternal-child attachment (Belsky & Fearon, 2002; DeWolff & Ijzendoorn, 1997; Fearon & Belsky, 2016; Letourneau et al., 2015). Moreover, numerous studies illustrate the positive effects of sensitivity on cognitive, social-emotional, and linguistic development of the child (Brady-Smith et al., 2013; Hirsh-Pasek & Burchinal, 2006; Landry et al., 2006; Lemelin et al., 2006; McFadden & Tamis-LeMonda, 2013; Smith, Landry, & Swank, 2006; Tamis-LeMonda et al., 2014; Zwönitzer et al., 2015).

1.2 Determinants of maternal sensitivity

Considering the importance of parental behaviour for the development of the child, there is the question of its determinants. Current theoretical models conceptualize parental behaviour, and thus also maternal sensitivity, as the result of complex interactive processes: mother and child, with their interaction skills, are engaged in circular reaction to each other and form complementary patterns of behaviour when in a more or less interaction-enabling environment (Pardini, 2008; Sameroff & Mackenzie, 2003). From a transactional perspective, maternal sensitivity is therefore to be understood as a dynamic construct, determined by multiple properties of the caregiver, the child, and dynamic contextual influences (Claussen & Crittenden, 2000; Simó, Rauh, & Ziegenhain, 2000). Each of these subsystems can have both functional and dysfunctional impacts on maternal sensitivity. In particular, psychosocial stress and support have proven to be most important for understanding parental behaviour (Belsky, 1984, 2014). Stress can be defined as 'a negative emotional experience accompanied by predictable biochemical, physiological, cognitive and behavioural changes that are directed either towards altering the stressful event or accommodating to its effects' (Baum, 1990). Psychosocial stress is not exclusively stress that parents experience because of child

rearing, but also due to their social, economic, cultural or psychological situation. Preoccupation with negative emotions related to these stressors may restrict parental attention, perception, empathy or emotional availability for the child and, as a consequence, diminish sensitive parental behaviour (Crittenden, 2016). For example, negative emotionality of the child increases risks to the physical (i.e. exhaustion, sleep deficit) and psychological (i.e. helplessness, impotent rage, or depression) wellbeing of the parents, which in turn may have a negative effect on their parental sensitivity (Papousek, 2010). Such effects are especially observable, when multiple stress factors cumulate and are not moderated by protective factors (Cicchetti, 2010). Moreover, child development, stress and protective factors may modulate change in maternal sensitivity (Belsky & Fearon, 2002). However, the following research overview describes essential stress factors affecting the child, the parent and their context with focus on their interaction in relation to parental interaction skills.

1.2.1 Parental factors

Psychological well-being is one of the best studied determinants of parental interaction behaviour. For example, mental disorders tend to be related to parenting difficulties – regardless of the specific diagnosis (Belsky & Jaffee, 2006; Johnson, Cohen, Kasen, & Brook, 2006; Schone & Wagenblass, 2012). The research overview by Goodman and Gotlib (1999) of the frequently studied phenomenon of depressive disorders illustrates, for example, that depressed mothers display more negative emotions, cognitions, and behaviours towards their children. They also have difficulty to sensitively address the social and emotional needs of their children. Nevertheless, several studies show that risks from mental disorders become especially effective in interaction with additional stresses, such as co-occurring maternal disorders, behavioural and emotional problems of the child, low maternal education, low family income, and low intelligence (Johnson et al., 2006; Lovejoy, Graczyk, O'Hare, & Neuman, 2000; Mertesacker, Bade, Haverkock, & Pauli-Pott, 2004; van Doesum, Hosman, Riksen-Walraven, & Hoefnagels, 2007).

In addition to psychological well-being, formal education has established itself as a potential risk or protective factor for sensitivity. Thus, parents with better education have higher cognitive and social resources, which, in turn, allow them more sensitive interactions with their children. These resources include for example, knowledge of developmental psychology, reasonable expectations, or flexible education strategies (Gudmundson, 2012; Gutman & Feinstein, 2010; van Doesum et al., 2007). The investigation by Gudmundson (2012) shows that the influence of education may be moderated by other factors: for families with low income, maternal education is an essential resource for maternal sensitivity – but only when there are no additional stress factors. In terms of income, the family stress model postulates that stress stemming from economic restrictions leads to non-optimal parenting (Conger & Donnellan, 2007). And yet, it is important to note that income is highly correlated with parental education. Nevertheless, the effects of education on maternal sensitivity are generally stronger (Gudmundson, 2012).

1.2.2 Child factors

Parent-child interaction may be affected by child development risks, such as developmental retardation, disability, premature birth, or a negative emotionality – in which, on the one hand the child's interaction with the parent and, on the other hand, the parent's concern about health and viability of the child play a role (Allen et al., 2004). Regarding developmental retardation or disability, the child's interactional behaviour may be difficult to understand and lead to defects and mismatches in early interaction, for example, parental interaction efforts are gradually reduced or lead to a directive, intrusive interaction style (Papousek, 2010). Nevertheless, in a meta-analysis on sensitivity of parents of children with autism spectrum disorder, mental retardation, language delay, and typical development, no significant differences in maternal sensitivity were found (van Ijzendoorn et al., 2007). A similar result was found for premature infants and low birth weight (i.e., < 2500 g): While preterm birth is stressful for parents because of the uncertain outcomes for their infants and separations due to incubator care, in the meta-analysis of Bilgin and Wolke (2015), mothers of preterm and full-term children did not differ significantly in terms of their maternal sensitivity – although the heterogeneity between studies was significant and high. Also regarding negative emotionality the empirical findings are varying. A number of studies could not confirm the connection between infant negative emotionality and lower sensitivity (Mertesacker et al., 2004). These inconsistent empirical findings are explained by various researchers to be the result of interactions between the child's developmental risks and other factors, such as moderating attributes of the caregiver or by the family context. As demonstrated by the example of negative emotionality, additional risks such as emotionally unresponsive attitudes of mothers (Crockenberg & McCluskey, 1986), low social support and depression (Mertesacker et al., 2004) or situational demands of the interaction (Ciciolla et al., 2013) increase the likelihood of an adverse effect on sensitivity.

In addition to child development risks, birth order and sex of the child should be considered as factors influencing maternal sensitivity. Mothers are often less sensitive in their interactions with the younger children than the older ones, which could be ascribed to the competing demands of responding sensitively to two children at the same time (Kennedy, Betts, & Underwood, 2014; Teti, Sakin, Kucera, Corns, & Eiden, 1996; van Ijzendoorn et al., 2000). Concerning children's sex, the empirical findings are less clear: while Biringen, Robinson, and Emde (1994) found no difference in sensitive parenting between boys and girls, in more recent studies, mothers of daughters had higher sensitivity scores than mothers of sons (Bornstein et al., 2008; Ciciolla et al., 2013; Lovas, 2005).

1.2.3 Contextual factors

Social support is a key determinant of parenting quality (Belsky, 1984). Various studies show that social support positively affects sensitivity (Crnic et al., 1983; Crockenberg & McCluskey, 1986; Jackson et al., 2013; Mertesacker et al., 2004; Pianta, Sroufe, & Egeland, 1989; Shin et al., 2006). Conversely, if there is no support, negative influences are mainly to be expected if additional risk

factors are present, such as negative emotionality of the child (Mertesacker et al., 2004) or special needs of the parents due to single parenting or limited access to social and financial resources (Jackson, Preston, & Franke, 2010). Social support has proven itself to be a protective factor for the quality of mother-child relationships in at-risk families (Stack et al., 2012).

There are different findings about how the parental relationship influences parent-child interactions. In the presence of partnership problems, there is a risk, due to self-absorption, that children's needs are neglected or that the child becomes overstimulated. Spousal withdrawal from partner conflict can engender hostile and intrusive parenting (Belsky, 2014; Papousek & Papousek, 1990). Belsky (2014) points out in his research overview that partnership problems also foster more sensitive and involved parenting. In some cases, this probably reflects parents' efforts to protect the child from parental relationship stress. In other cases, it may indicate a problematic compensation of unmet emotional needs in the couple's relationship.

Finally, various cross-cultural studies suggest that differences in sensitive parenting are determined by psychosocial stress due to minority status and cross-country migration (Emmen, Malda, Mesman, Ekmekci, & Ijzendoorn, 2012; Mesman et al., 2012). In the case of migration, feelings of rootlessness and uncertainty can cause severe psychological stress, particularly in the early stages of the migration process (Lanfranchi, 2002). Moreover, in various countries minorities experience more psychosocial stressors such as higher rates of poverty, teenage motherhood, single parenthood, fragmented family and support system, pressure to conform, discrimination, or obstructed access to the medical and mental health care system (National Poverty Center, 2009; Platt, 2007; Wanner & Fibbi, 2002). However, different types of psychosocial stress originating from the child, the parents and the context as well as their interactions have hardly been analysed in multi-ethnic samples yet.

1.3 The present study

Based on Belsky's (1984) Process Model of the Determinants of Parenting and empirical findings, the present work investigates the effects and mechanisms of parental, filial and contextual predictors of maternal sensitivity. The research overview makes it clear that (1) accumulation or severity of psychosocial stress increases the likelihood of adverse effects and (2) interactions exist between multiple factors which have only rarely been studied simultaneously, particularly in at-risk families. Following up on this, in the context of at-risk families with infants in the first half year of life, two questions were examined: (1) How does the magnitude of psychosocial stress affect maternal sensitivity? (2) How does stress originating from the child, the parents and the context affect maternal sensitivity and are interaction effects present? Given the empirical data, it is assumed for the first question that there is a negative correlation between the degree of stress exposure and maternal sensitivity. Likewise, for the second question, negative effects from the stress areas on maternal sensitivity are to be expected. However, it remains unclear and to be further investigated, how

individual child-, parental and contextual stressors come into effect or interact. The focus is on areas that are central to the functioning of the family and for the physical and psychological wellbeing of the child during the first months of life: material, social, personal-familial, and child-related stress. In addition, there are further possible determinants of maternal sensitivity to be considered as control variables in the present study: maternal education, being primipara, duration of stay (foreigners), low birth weight, child age, and child sex.

2 Methods

The data used in the present study are taken from the ongoing long-term study 'ZEPPELIN', an experimental between-group study following the 'gold standards' for evidence (Flay et al., 2005). This study examines the effectiveness of early support via the parent education programme Parents as Teachers (PAT) in at-risk families (Lanfranchi & Neuhauser, 2013). Feasibility of early detection, recruitting and data collection in at-risk families was successfully examined in the pilot study ZEPPELIN-M (Lanfranchi, Neuhauser, Caflisch, Kubli, & Steinegger, 2011). Methodology and methods were approved by the Swiss National Science Foundation and the cantonal Ethics Committee of Zurich. The present work refers to the baseline data which were collected before the intervention.

2.1 Participants and procedure

The ZEPPELIN study is unique in Switzerland amongst surveys of families at risk. Families were recruited in the suburbs of Zurich between 2011 and 2012 in collaboration with existing community service infrastructures (e.g., maternity wards, medical and social services) and, in particular, regional parent counselling offices (i.e., basic service facilities open to all parents giving low-threshold, cost-free counselling about health, child development and parenting). This network assessed the family's psychosocial stress factors using a short screening form. To be eligible for the study, families had to be subject to psychosocial stress and children not be older than 4 months at the time of admission. Using these criteria, a total of 587 families were identified as potentially risk-exposed during the recruitment phase, of whom 251 (264 children) finally participated in the project and baseline data collection (Neuhauser et al., 2015).

At the time of the data collection, the mothers were between 16 and 45 years old (M = 30 years, SD = 5.77) and the children's corrected age ranged between 0 and 8 months (M = 2.69 months, SD = 1.54), with 87% of the children being 4 months old or younger and 59% being female. Most mothers shared their household with a partner; only 12% were single mothers. Only 14% of mothers were of Swiss origin, the others were immigrants or descendants of immigrants of various other origins (25% Balkan countries, 11% Turkey , 9% Portugal, 9% Central and East Asia, 32% other countries). Thirty-one percent of mothers could not communicate at all or only inade-

quately in the local language (German). The mean value for the International Socio-Economic Index of Occupational Status (ISEI) (Ganzeboom, DeGraaf, & Treiman, 1992) was 35.58 (*SD* 15.20). By comparison, in PISA 2000, the ISEI average for Switzerland was 49 (Coradi Vellacott, Hollenweger, Nicolet, & Wolter, 2003). A more precise description of the risk constellation is given as part of the descriptive results.

2.2 Measures

For data collection, families were visited by one member of the research team who was blind to the risk status of the dyad. They were accompanied, if necessary, by an intercultural translator.

2.2.1 Demographic information

Sociodemographic information was collected with the help of a semi-structured interview. Variables collected include sex of the child (0 = male; 1 = female), low birth weight (0 = equal or more than 2500 g, 1 = less than 2500 g), child's age at measurement, being primipara (0 = no, 1 = yes), percentage of lifetime (in years) residing in Switzerland before the birth of the child (values of the continuous variable range from 0 [= less than a year] to 1 [= born in Switzerland]), and maternal education, amongst others. Maternal education was constructed as the mother's highest level of educational qualifications and dichotomously coded as 'compulsory education' (0 = lack of education, special education or completion of compulsory schooling) and 'post-compulsory education' (1 = vocational education, college education or university).

2.2.2 Maternal sensitivity

To assess maternal sensitivity, a play situation lasting 3 min at the family's home was videotaped and coded with the CARE-Index (Crittenden, 2010). Precisely defined, 'adult sensitivity in play is any pattern of behaviour that pleases the infant and increases the infant's comfort and attentiveness and reduces its distress and disengagement' (Crittenden, 2010, p. 10). The assessment includes seven dimensions of dyadic behaviour: facial expression, verbal expression, position and body contact, affection, turn-taking contingencies, control, and choice of activity. Each of these dimensions is assessed in terms of three adult- and four infant-scales. For adults, the scales are: sensitive, controlling, and unresponsive behaviour; for the infant: cooperative, difficult, compulsive, and passive behaviour. For each dimensional dyadic behaviour, 2 points can be awarded on each mother- and child scale. Within a behavioural dimension, two points then fall either into the best-fitting scale (e.g. sensitive for the mother and cooperative for the child) or a point each is assigned to the two best-fitting scales, resulting in a mixed pattern (e.g. sensitive-controlling for the mother and cooperative-difficult for the child). The aggregation of all behavioural modalities yields a mother and child-interaction pattern, each of which must contain 14 points, either in a single scale or as a mixed

pattern. The validity of the procedure has been verified in different studies. That is, maternal sensitivity as measured by the CARE-Index largely correlates with secure attachment (Simó et al., 2000; Ward & Carlson, 1995), parenting opinions (Leventhal, Jacobsen, Miller, & Quintana, 2004), stress constellations (Sidor et al., 2012; Svanberg, Mennet, & Spieker, 2010), maternal psychiatric disorder (Cassidy, Zoccolillo, & Hughes, 1996; Kemppinen, Kumpulainen, Moilanen, & Ebeling, 2006), and maltreated infants (Crittenden, 1981; Crittenden, 1985).

In the present study, reference is made solely to the sensitivity scale. Three coders were trained and certified by the author of the measure with an intraclass correlation coefficient (*ICC*) > .80 for each coder. Additionally, each coder scored a test set with 25 videos of the sample independently and blind to family background information. The intraclass correlation for maternal sensitivity was .82 among the three coders.

2.2.3 Stress constellation

The assessment of stress and protective factors was performed using the Heidelberg Stress Scale (HBS) (Sidor et al., 2012). The HBS measures a family's stress in the following areas: (1) stress on the part of the child; (2) personal-familial stress; (3) social stress, and (4) material stress. In addition to stress factors, protective factors can be incorporated into the assessment. The values range between 0 (no stress) and 100 (very high stress). The values in the four stress categories are separately assessed in a fifth dimension, as the global stress amount. Regarding validity, significant correlations were found with both maternal sensitivity, maternal distress, and prediction of taking the child in care (Sidor et al., 2012).

The assessment is based on semi-structured interviews asking about stress factors (e.g., employment situation, social contacts, course of pregnancy and birth, health, relationship, behaviour of the child, traumatic experiences), as well as on observations during the research visit to the family's home (e.g., size and furnishing of the apartment, presence of toys, parental behaviour, appropriate environment). Three members of the research team individually assessed the stress constellations of the families they visited. All three members coded a subsample of 30 randomly chosen case vignettes. The intraclass correlation was .78 for child-related stress, .64 for familial stress, .74 for social stress, .84 for economic stress, and .69 for the global stress score.

2.3 Data analysis

Two sets of statistical analyses were carried out. To test the hypothesis presented in this study, first, a *path model* was developed and tested to examine the direct paths from the risk global score to maternal sensitivity. Analyses were conducted using Mplus version 7. In the second set of more exploratory analyses, a *hierarchical multiple regression analysis* using SPSS 23 was performed to

examine the effects of the four stress categories as well as their interactions. For both sets of analyses, alpha was set at .05.

The sample consists of 251 families and 264 children (26 twins). In the existing twin videos, it was randomly determined (alternately, by weight), which of the two parent-child interactions was to be evaluated. Moreover, the data of three families were excluded because of a severe disability diagnosis after the baseline data collection. After this data reduction, the sample consists of 248 mothers and children. In 37 families (15%), no video recordings were made, for 1 mother information on education and for 2 mothers information on duration of residence in Switzerland were missing. For all other variables studied, the data set is complete. Missing values were included using multiple imputation in order to reduce biased estimate results as far as missing at random (MAR) can be assumed (Enders, 2010).

3. Results

The results are presented in three steps: first, the sample is described with respect to risk constellation and bivariate correlations between the studied variables. Based on this, two questions are addressed: first, the hypothesis is tested, according to which an increase of overall psychosocial stress decreases maternal sensitivity. Second, the relation of investigated stress factors to maternal sensitivity is examined, and whether interaction effects are present.

Table 1. *N*, *M, SD*, and range for the study variables.

	N	*M*	*SD*	Range
Continuous variables				
Maternal sensitivity	211	5.54	1.77	0 – 12
Global stress	248	46.26	16.13	10 – 90
Social stress	248	35.94	21.37	0 – 90
Material stress	248	37.75	25.20	0 – 91
Personal/familiar stress	248	46.75	21.55	0 – 91
Child-related stress	248	18.69	19.82	0 – 80
Child age (days)	248	92.00	47.00	-32 – 272
Duration of residence	246	.39	.36	0 – 1
Categorical variables				
Post-compulsory education	247	.65		0 – 1
Primipara	248	.59		0 – 1
Low birth weight (< 2500 g)	248	.09		0 – 1
Child sex (female)	248	.53		0 – 1

3.1 Description of stress patterns in the families and the relations between the variables

The socio-demographic characteristics of the sample indicate that families with psychosocial stress were recruited: Table 1 shows that stress assessed with the HBS is most pronounced in the personal-familial category, followed by material and social burdens. In contrast, the expression of stress in the child is minute. The global stress exceeds the limit of 40 (out of a maximum 100 points), that is, in the majority of the families, an intervention is indicated. The same is true for the sensitivity values, which average at 5.54 points (out of a maximum of 14 points), in the intervention range of the scale (Crittenden, 2010). Moreover, 73% of the mothers were non-Swiss, 45% of mothers had compulsory or lesser education (23% finished compulsory school, 12% did not graduate), 65% had post-compulsory education (35% vocational education; 14% college education; 16% university).

Table 2. Relations among the study variables.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Sensitivity	-											
2. Global stress	-.29**	-										
3. Social stress	-.32**	.53**	-									
4. Material stress	-.27**	.64**	.34**	-								
5. Personal/familiar stress	-.09	.66**	.02	.32**	-							
6. Child-related stress	.08	.13*	-.15*	-.12	.08	-						
7. Educational level	.24**	-.27**	-.27**	-.33**	-.08	.17**	-					
8. Duration of resid.	.24**	-.14*	-.50**	-.20**	.12	.18**	.18**	-				
9. Primipara	.13	-.21**	-.21**	-.22**	-.10	.22**	.32**	.10	-			
10. Low birth weight	.13	.02	-.02	-.08	.04	.24**	-.01	.07	.03	-		
11. Child age	.12	.02	-.03	.09	.07	-.01	.01	.01	-.02	-.14*	-	
12. Child sex	.01	.03	-.07	.08	.02	.05	.01	.00	.08	.07	-.05	-

Note. Missing cases pairwise deleted.
*p < .05 **p < .01 ***p < .001

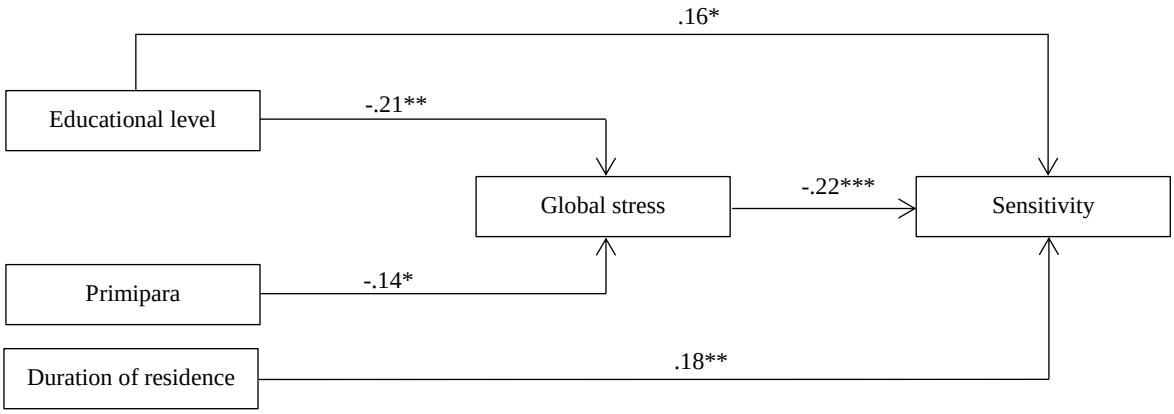
Table 2 presents the intercorrelations among the study variables. A lower value for the dependent variable ‘maternal sensitivity’ is associated with a tendency towards higher risk expression in the independent variables, that is, towards higher global, social and material stress, shorter residence in Switzerland, and a lower level of education.

The global stress estimate positively and significantly correlates with all stress factors, as well as with lower education, less time living in Switzerland, and having more than one child. In contrast, the child-related stress seems to have a special status when considering individual stress factors: families with child-related stress tend to have a less pronounced risk constellation and they tend to reside longer in Switzerland – but they are also more likely to be primipara and their children tend to have low birth weight. On the other hand, material stress is associated with all risk factors, except child-related stress. And finally, different correlation patterns emerge in regard to social and perso-

nal-familial stress: social stress is significantly associated with lower child-related stress, but with higher global and material stress, shorter residence in Switzerland, lower education, and having more than one child, whereas personal-familial stress is significantly related to global and material stress only.

3.2 Variance in maternal sensitivity as explained by degree of global stress

To test the hypothesis that the severity of stress was negatively correlated with maternal sensitivity, a saturated path model was specified with all controls as exogenous variables and the global stress score and sensitivity as endogenous variables ($N = 248$). Figure 1 shows that increased psychosocial stress under consideration of all control variables decreases maternal sensitivity ($B = -.22$, $SE = .06$, $p = .00$). Maternal education exerts both a direct ($B = .16$, $SE = .06$, $p = .01$) and an indirect effect on maternal sensitivity, mediated via the total stress amount ($B = .05$, $SE = .02$, $p = .02$). Moreover, being primipara has a negative effect on the global stress score ($B = -.14$, $SE = .06$, $p = .03$), but no significant indirect effect on maternal sensitivity. The duration of residence in Switzerland has a positive direct effect on maternal sensitivity ($B = .18$, $SE = .06$, $p = .00$). All other control variables (not specified in figure 1: birth weight, child sex and child age at measurement) had no significant effect on the global stress score nor on maternal sensitivity.



*$p < .05$ **$p < .01$ ***$p < .001$

Figure 1. Pathmodel with significant relationships between global stress score, maternal sensitivity and control variables. For the other control variables – birth weight, child sex and child age at measurement – no significant paths were found (they are not specified in the model).

3.3 Variance in maternal sensitivity as explained by different stress factors

Hierarchical regression analyses explored the unique and interactive effects of different stress factors while controlling for education, duration of residence in Switzerland, being primipara, birth weight, age of child at measurement and child sex. As a first step, the various stress factors are introduced, followed by the interactions, and finally, the control variables. The scales of the HBS were scaled to the value range of 0-10 and for calculating the interaction terms, the stress factors were centred (Enders, Baraldi, & Cham, 2014).

Table 3. Hierarchical regression analysis predicting maternal sensitivity.

	Model 1			Model 2			Model 3		
	B	*SE*	β	*B*	*SE*	β	*B*	*SE*	β
Intercept	5.50	.12		5.60	.14		4.47	.38	
Social stress	-.22	.06	-.26***	-.23	.06	-.27***	-.16	.07	-.19*
Material stress	-.11	.05	-.15*	-.10	.05	-.15*	-.08	.05	-.11
Personal/familiar stress	-.04	.06	-.04	-.04	.06	-.04	-.06	.06	-.08
Child-related stress	-.00	.06	.00	.02	.06	.02	-.03	.06	-.03
Social x material stress				-.01	.02	-.01	-.01	.02	-.03
Social x pers./fam. stress				.03	.03	.08	.03	.03	.08
Social x child-related stress				.01	.03	.02	.00	.03	.01
Material x pers./fam. stress				-.07	.03	-.18*	-.07	.03	-.20**
Material x child-related stress				-.02	.03	-.07	-.01	.03	-.04
Pers./fam. x child-related stress				.03	.03	.09	.02	.03	.06
Educational level							.53	.27	.14*
Duration of residence							.58	.39	.12
Primipara							-.07	.25	-.02
Low birth weight (< 2’500 g)							.72	.41	.12
Child age at measurement							.01	.00	.14*
Child sex							.14	.23	.04
ΔR^2		.12***			.04			.06*	

Note. B, SE B, β und ΔR^2 are the pooled estimates from the imputed data sets (Enders, 2010).
* $p < .05$ ** $p < .01$ *** $p < .001$

As shown in table 3, a significant effect on maternal sensitivity is exerted primarily by social and economic costs (model 1). While the negative effect of social stress remains stable in all investigated models, the negative effect of material stress loses its statistical significance after the introduction of the control variables (model 3), yet material stress remains in effect via interaction with personal-familial stress (model 3). The significant negative interaction coefficient indicates that the relationship between material stress and maternal sensitivity tends to be more strongly negative for individuals with higher personal-familiar stress and vice versa. Johnson-Neyman probing (Hayes & Matthes, 2009) yields the following moderating effects: material stress has a significant negative effect on sensitivity at high values of personal-familial stress, starting at 5.09. Conversely, personal-familial stress becomes negatively significant if economic stress is at 4.68 points or more. And

finally, concerning control variables, maternal education and child age at first measurement indicate direct significant impact on maternal sensitivity. The total explained variance is 22% and 17%, respectively (adjusted R^2).

4. Discussion

The aim of this study was to investigate the association between psychosocial stress and maternal sensitivity in at-risk families. In the following the research questions are discussed: (1) How does the magnitude of psychosocial stress affect maternal sensitivity and (2) how does stress originating from the child, the parents and the context affect maternal sensitivity and are interaction effects present?

To answer the *first question*, the accumulation of various stress factors (global stress value of the families) was assessed, and its effect on maternal sensitivity investigated. In reference to Belsky (1984), the hypothesis that increased overall psychosocial stress decreases maternal sensitivity was tested. The descriptive analyses already show that two-thirds of the dyads are in the inept range between 7 and 4, that is, in an area in which clear unresolved problems are observable in the interaction (Crittenden, 2010). This below-average expression of maternal sensitivity was to be expected, due to the stress constellations in the studied sample. And even within the group of psychosocially stressed families, the negative correlation between psychosocial stress and maternal sensitivity could be confirmed by means of path analysis.

To answer the *second question*, the effects of various stress factors and their interactions on maternal sensitivity were examined. Included factors encompassed the three categories identified by Belsky's (1984) parenting process model: (1) parent effects, such as parental-familial stress, (2) child effects, such as child related stress, and (3) contextual effects, such as social stress and material stress. Maternal education, duration of residence in Switzerland, being primipara, birth weight, child's age at measurement and child sex were considered as control variables.

The analyses show that different stressors of varying effect sizes explain the variance of maternal sensitivity. The *social stress* is the one that displays the strongest influence across all models within the simultaneous analysis of the various stress factors: the less social support mothers experienced, the lower maternal sensitivity. This result is consistent with empirical findings, according to which social support has a positive effect on parental interaction behaviour (Crnic et al., 1983; Crockenberg & McCluskey, 1986; Jackson et al., 2013; Mertesacker et al., 2004; Pianta et al., 1989; Shin et al., 2006). Moreover, promotion of social support is considered as an important intervention objective for families at risk (Ziegenhain, 2004). The buffering interpretation of social support, which holds that social support is beneficial mainly to those who need assistance from others due to additional conditions and circumstances of risk, could not be confirmed due to lack of interaction effects. In at-risk families, social support seems to be an important resource for the expression of maternal sensitivity, independent of other stress factors.

The second contextual factor, *material stress*, in combination with medium to high personal-familial stress, exerts a significant negative effect on maternal sensitivity. The reduced effect for simultaneous testing with maternal education (model 3) indicates that (a) maternal education and economic stress are closely related, (b) education is generating a stronger effect on the maternal sensitivity than material stress, and (c) the effect of maternal education cannot be explained exclusively with material limitations. Instead, it is likely that the cognitive and social resources associated with higher education, that is, characteristics of the parents, lead to increasingly sensitive parenting behaviour. Corresponding correlations were found in various studies (Gudmundson, 2012).

Regarding *personal-familial stress*, only the interaction effect with material stress already described could be detected: under medium-to-high material stress, personal-familial stress has a significant effect on maternal sensitivity. The non-significant direct correlation with maternal sensitivity already began to emerge during descriptive analysis: despite the strongest expression in comparison with the other stress factors, personal-familial stress has a weak correlation with maternal sensitivity. The lack of findings may be related to the measure of personal-familiar stress used in the present study. The joint assessment of person-related stress (such as mental or health problems) and a family history (i.e. single parent or relationship stress) may not have been sensitive enough to capture differences in stress related to maternal sensitivity. It is likely that a separate and thus clearer detection of stress factors would lead to more distinct and more easily interpretable correlations.

Finally, no significant effect was detected for *child-related stress.* This means that in at-risk families, the traits of the child have less influence on the quality of interaction than parental and contextual factors. Given the descriptive data, this could be due to the privileged situation of families with child-related stress: the lower global stress constellation in combination with higher education and a longer residence in Switzerland yields to better conditions for sensitive interactions with the child and to have better resources to deal adequately with child-related stress.

Together, all variables in the hierarchical regression analysis explained 17% (adjusted R^2) of the variance in maternal sensitivity. The largest proportion of variance comes from the simple stress components. In previous research investigating predictors of maternal sensitivity, depending on sample, measures and methods, the values obtained were between 10% and 30% (Calkins, Hungerford, & Dedmon, 2004; Ciciolla et al., 2013; Crnic et al., 1983; Musser, Ablow, & Measelle, 2012; Pianta et al., 1989; Smith, 2010; van Doesum et al., 2007), in exceptional cases, explained variance amounted up to 60% (Shin et al., 2006). Because families in our sample were at-risk, it is possible that there was not sufficient variability in risk constellation and maternal sensitivity (see Table 1) to prove a greater proportion of variance or additional significant effects. Moreover, additional predictors might be important to explain variance in maternal sensitivity. The possibility must be entertained, that interactional behaviour might be a product of how parents were raised by their own

parents; therefore, biographical and psychological measurements should be considered (Belsky, 1984).

4.1 Limitations and future research

Although the contribution of stress factors appears to be important, it is essential to consider some limitations when interpreting the findings. First, statements about causality are limited, because the data are not longitudinal. Nevertheless, some of the most important predictors, like social stress and education, are quite stable constructs. Hence, there is reason to assume that they have an influence on maternal sensitivity.

Second, the determinants of maternal sensitivity examined in this study were not exhaustive. More precise and/or additional factors might be important to understanding differences in maternal sensitivity: for example, more fine-grained measures for personal and familial stresses than used in this study could provide more specific information. Moreover, in the present work, unexamined constructs such as maternal attachment representations and self-identity as a mother proved to be important predictors of maternal sensitivity (Priddis & Howieson, 2009; Shin et al., 2006; Ziegenhain, Fegert, Ostler, & Buchheim, 2007).

Finally, the findings show that different stress factors influence maternal sensitivity in different ways, emphasizing the importance of considering multiple determinants of parenting within the same study. Another revealing approach could be to assess the effects of different risk constellations – as found in the empirical data. This is promising, because in real life at-risk families are usually affected by a constellation of different stress factors. For example, the descriptive findings in this study discovered that families experiencing higher child-related stress tend to be more privyleged regarding other risk factors and education. This constellation must be distinguished from the other families, for example, affected by almost all stress factors. Accordingly, the mechanisms of action of different predictors and constellations are of special interest to draw conclusions for the implementation and development of interventions. Thus different questions arise, for example, how the stress constellation impacts maternal sensitivity or what the uses and effects of early interventions are.

4.2 Implications for practice

This study revealed the extent and type of influence psychosocial stress has on the expression of maternal sensitivity in at-risk families. This work helps to elucidate the aetiology of maladaptive mother-infant interactions, identify families in need for intervention, as well as add specificity to the development of interventions designed to enhance parenting behaviour. In the following conclusions for diagnostics and early intervention are drawn.

In general, the results demonstrate in accordance with Belsky (1984) and attachment theory, that parenting behaviours observed in at-risk families depends on the specific psychosocial stress constellation, that is, endangering family life circumstances (Crittenden, 2016). Interventions should therefore be adapted to the situation of the families and the specific needs of families, which in turn requires a careful and *case-specific assessment* of risks and family functioning (Crittenden, Dallos, Landini, & Kozlowska, 2014; Ziegenhain et al., 2007). In families with migration background, in particular, contextual stresses should be considered.

Regarding *early intervention*, programmes that aim to increase maternal sensitivity play a key role. In recent years, intervention research has progressed beyond generic effects addressing the question 'what works for whom' (Avellar et al., 2016; Belsky, 2014; Berlin, 2005). For at-risk families, attachment-based interventions have proven to be effective in enhancing maternal sensitivity and secure maternal-child attachment (Bakermans-Kranenburg, Ijzendoorn, & Juffer, 2003; Egeland, Weinfield, Bosquett, & Cheng, 2000; Letourneau et al., 2015). For ethnic minority families, as they have been largely examined in the present study, Mesman et al. (2012) recommend to combine interventions to promote parental sensitivity and reducing family stress. Transferred to the results of the present study, particularly social, material, and familial stress should be countered in a targeted way. In a support programme, this could possibly be done by promoting social contacts and/or development of coping skills and behaviours to obtain material, personal, and social resources. Families should be enabled to gain control and responsibility for themselves and their surroundings. In addition to individual support and assistance by qualified personnel, regularly held support groups to exchange experiences with other parents, play groups for the children, as well as information about and visits to offices and services in the community (library, playgrounds, counselling centres, etc.) are also suitable for this purpose. Furthermore, educational disadvantages should be addressed. The enhancement of knowledge about developmental psychology and reflective thinking skills is essential here. Reflective thinking is associated with more child-focused beliefs, goals, and behaviours, which in turn is important to identify the children's needs. Knowledge and understanding of children's age-appropriate developmental tasks help to recognize and accurately interpret the meaning of children's behaviour. Both are essential for sensitive parenting (Gudmundson, 2012). Additionally, Ziegenhain (2004) highlights the need to prepare and support such programmes by contextual conditions or ongoing supporting aids. Targeted relief, such as home-based delivery, financial support, or measures to overcome language and cultural barriers, makes it possible for parents to engage in early interventions.

The effectiveness of such broadband approaches is discussed conversely (Bakermans-Kranenburg et al., 2003; Berlin, 2005; Egeland et al., 2000; Letourneau et al., 2013) and has been studied hardly in ethnic minority families (Avellar et al., 2016). Addressing the question 'what works for whom', additional stringent evaluation of the applicability and effectiveness of early interventions in ethnic minority families is needed.

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The mediating role of maternal sensitivity: Enhancing language development in at-risk families[1]

Abstract. Home visiting programs have gained increasing importance in family-centered prevention and intervention. However, few studies have examined the mechanisms underlying early intervention treatment effects. The goal of this study is to analyze the mediating role of maternal sensitivity in enhancing language development with the home visiting program Parents as Teachers (PAT). Data was collected and analyzed within the ongoing long-term ZEPPELIN study, a randomized controlled trial with 251 participating at-risk families. Via longitudinal mediation analysis we examined whether effects of PAT on receptive and expressive language outcomes at 24 and 36 months were mediated by maternal sensitivity at 12 months. Within a moderated mediation framework we investigated whether the level of family psychosocial stress affects this mediation. The results show that intervention effects on language outcomes are mediated by maternal sensitivity but weakly and through specific pathways. Moderation and moderated mediation analyses indicate that the effects of PAT and also specific mediation effects increase with the level of psychosocial stress. Implications of the results for practice are discussed.

1. Introduction

An important outcome domain in many early intervention studies is language abilities. This is because, for one, early language development is critical in shaping future language, social, and academic abilities (Elbro, Dalby, & Maarbjerg, 2011; Law, Rush, Schoon, & Parsons, 2009; Rescorla, 2011). For another, language abilities are susceptible to early interventions. There is little debate that the human potential for language has a genetic basis, but to be realized, language development makes requirements on the social environment (Hoff, 2006). That is, language acquisition is supported by the quality and quantity of opportunities for communicative experience provided by the caregivers. But preoccupation with negative emotions related to risks or potential stressors, such as social isolation, poverty, or immigration, may restrict the caregivers' attention, perception, empathy, or emotional availability (Belsky, 2014; Crittenden, 2016; Mesman et al., 2012; Ziegenhain, 2007). As a consequence, this may diminish support for child development, including development of early language skills (Hoff, 2006; Rodriguez et al., 2009). For example, already at the age of 18 months, children living in low-income households have smaller vocabularies when compared to their more advantaged peers (Fernald, Marchman, & Weisleder, 2013). To prevent negative consequences of this kind, early intervention programs have become more important in family-centered prevention and intervention. However, although the relevance of causal mechanisms for methodology and

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design of preventive interventions is acknowledged (Gottfredson et al., 2015; Reynolds & Ou, 2015), few studies have examined the pathways that account for early intervention outcomes (Coles et al., 2015; Parents as Teachers National Center, 2003). To contribute towards filling this gap, in this study a mediational model is conceptualized. According to the bioecological model of Bronfenbrenner and Morris (2006), distal factors are hypothesized to shape developmental outcomes via environmentally transmitted influences on proximal factors. Specifically, first, the effects of the home visiting program Parents as Teachers (PAT) on receptive and expressive language outcomes through the mediator maternal sensitivity are examined and second, whether any effects are moderated by psychosocial stress faced by the families.

1.1 Maternal sensitivity and early language development

For most children, early caregiver-child interaction is the primary and one of the most common sources of language experience. The interaction between caregiver and infant is highly dependent on the caregiver's ability to perceive and to interpret the child's signals and respond to them promptly and appropriately. These dyadic characteristics are rooted in the definition of *maternal sensitivity* in early theories of attachment (Ainsworth et al., 1978) and are also referred to as *responsiveness* in many studies on language development (Tamis-LeMonda & Baumwell, 2011). Sensitivity is linked to children's outcomes across developmental domains (DeWolff & Ijzendoorn, 1997; Hirsh-Pasek & Burchinal, 2006; Landry, Smith, Miller-Loncar, & Swank, 1997; Raby et al., 2015; Zwönitzer et al., 2015) and therefore seen as a general predictor for child learning and development. However, sensitivity is a multicriterion construct defined and operationalized differently within the same or across different research domains, which several researchers have discussed critically (Claussen & Crittenden, 2000; Nicholls & Kirkland, 1996; Tamis-LeMonda & Baumwell, 2011). For example, sensitivity may be defined as affectively warm responses to infant cues, as synchronous temporal contingencies, or as cognitively stimulating qualities of parental behavior (Claussen & Crittenden, 2000). Accordingly, research findings indicate, that specific dimensions of the sensitivity construct may support specific aspects of development at specific ages (Vallotton, Mastergeorge, Foster, Decker, & Ayoub, 2017). Regarding the field of language acquisition, parent's prompt and contingent responses to children's communications and exploratory actions has proven to be predictive. These kinds of early experiences contribute to a joint attentional focus, which is an optimal learning environment for new linguistic information provided by the parent (Topping, Dekhinet, & Zeedyk, 2013). They also support infants' growing pragmatic understanding that language is a tool to share intentions with others, which is foundational for language learning over time. And they yield benefits for semantic development, whereby three characteristics of parental sensitivity have proven to be important: contiguity and contingency, didactics and embodiment, and scaffolding. Although type and frequency of parental responses might differ between cultural communities, there is evidence

that the characteristic features of sensitivity are universally displayed and that they are associated with children's language development across families from different cultural communities and socio-oeconomic strata (Tamis-LeMonda et al., 2014).

1.2 Early interventions promoting maternal sensitivity and language development

If language development is to be promoted by means of improving maternal sensitivity, there is a need to understand the determinants of maternal sensitivity. From a transactional perspective, maternal sensitivity is conceptualized as a dynamic construct, determined by mutual effects between properties of the caregiver, the child, and the environment (Claussen & Crittenden, 2000; Sameroff, Fiese, & Zigler, 2000). Each of these features can have both functional and dysfunctional impacts. In particular, psychosocial stress is widely regarded as one of the strongest predictors of parenting behavior and thus a risk for parent-child interaction and child development (Belsky, 1984, 2014; Laucht et al., 2000; Sameroff et al., 2009). To prevent negative impacts of psychosocial stressors, early intervention programs are assumed to play a key role. However, so far little is known about the underlying causal mechanisms or pathways for home visitation programs – that is, about the indirect promotion of child development by means of improving earlier interaction processes between child and caregiver (Coles et al., 2015; Parents as Teachers National Center, 2003). There are only few studies investigating the mediating role of maternal sensitivity (e.g. Landry et al., 2006), highlighting the importance of different aspects of sensitivity mediating the intervention effect on specific infant skill domains. By contrast, research studies have focused mainly on whether early intervention programs have effects on maternal sensitivity or the child's language development. Regarding maternal sensitivity, the large number of intervention studies conducted on at-risk samples show promising outcomes in general, with the most at-risk families making progress similar or better than more advantaged families (Bakermans-Kranenburg et al., 2003; Letourneau et al., 2015). Regarding language development, reviews of home visiting programs indicated in general heterogeneous effect sizes (Gomby, 2005; Mathematica Policy Research, 2016), with some meta-analyses showing small effects on cognitive and languages outcomes (Filene et al., 2013; Sweet & Appelbaum, 2004). Also, some studies revealed higher benefits for children from families with lower psychosocial resources, such as found in the Nurse Family Partnership program (Kitzman et al., 2010; Olds et al., 2014). For German-speaking countries, which have their own specific cultural environments, early intervention structures, and policies (Benz & Sidor, 2013), the meta-analysis of Taubner et al. (2015) reveals, that especially the Ulm Model showed significant effects on maternal sensitivity (Bovenschen et al., 2012; Pillhofer et al., 2015; Ziegenhain, Derksen, & Dreisörner, 2004). On the other hand, no effects on language development were found (Taubner et al., 2015). Regarding the PAT program investigated in this article, a recent systematic review on the effectiveness of PAT with at-risk families found no evidence for significant positive effects on different measures of parent-child interaction

(Neuhauser, 2014). Concerning language development, one study showed effects of PAT on language development at child age 4-5 years (Drazen & Haust, 1993). In another study, subgroup analyses of at-risk families with a migration background (Latin America) found positive effects on language development at age 2-3 years (Wagner, Clayton, Gerlach-Downie, & McElroy, 1999).

1.3 This study

This study uses data from the ongoing long-term intervention study ZEPPELIN (Zurich Equity Prevention Project with Parents' Participation and Integration), to investigate the causal mechanisms underlying PAT treatment effects on language development in families with psychosocial stress. To conduct this analysis, we first examine whether effects of PAT on receptive and expressive language outcomes at 24 and 36 months are mediated by maternal sensitivity at 12 months. Therefore a general construct of maternal sensitivity is used including aspects of behavior related to both, affect and temporal contingency (Crittenden, 2010). Taking up the PAT theory of change (Parents as Teachers National Center, 2011), we assume that the early intervention has a positive indirect effect on receptive and expressive language outcomes at 24 and 36 months. Second, within a moderated mediation framework we investigate for whom the early intervention is the most effective. The aim here is to find out whether any effects of PAT are moderated by psychosocial stress. Based on available empirical findings for maternal sensitivity and language outcomes, we assume that families with higher psychosocial stress benefit more from the early intervention program (Letourneau et al., 2015; Olds et al., 2014; Wagner et al., 1999).

2. Method

2.1 Participants

Families were recruited in the suburbs of Zurich from 2011 to 2012 in collaboration with existing community service infrastructures (e.g., maternity wards, medical and social services) and mainly with regional parent counseling offices (i.e., basic service facilities open to all parents providing low-threshold, cost-free counseling on health, child development, and parenting). This interdisciplinary network assessed the family's psychosocial stress factors using a short screening form that was constructed based on the Heidelberg Stress Scale (HBS) (Sidor et al., 2012). To be eligible for the study, families had to have psychosocial risks and also children not older than 4 months of age at the time of study recruitment. Using these criteria, a total of 587 families were identified as potentially risk-exposed during the recruitment phase; of these, 251 families (264 children, 26 twins) participated in the project and baseline data collection (Neuhauser et al., 2015). The data on three families

were excluded because of a diagnosis of severe disability after the baseline data collection; four further families were excluded from the analyses due to lack of a psychosocial stress constellation (the score on the Heidelberg Stress Scale was below 20, which indicated 'insufficient' psychosocial stress for the study).

After the exclusions, the sample consisted of 244 mothers and children. At the time of the baseline data collection, the mothers ranged in age from 16 to 45 years (M = 30, SD = 5.73), and the children were on average 92 days of age (SD = 47.06). The sociodemographic characteristics of the sample indicate that families with psychosocial stress and migration background were recruited. For example, only 14% of mothers were of Swiss origin; the remaining mothers were immigrants or descendants of immigrants from various regions (25% Balkan countries, 11% Turkey, 9% Portugal, 9% Central and East Asia, 32% other countries). The mean value on the International Socio-Economic Index of occupational status (ISEI) (Ganzeboom, DeGraaf, & Treiman, 1992) was 35.30 (*SD* 15.13). By comparison, in PISA 2000, the ISEI average for Switzerland was 49 (Coradi Vellacott et al., 2003). A more precise description of the risk constellation is provided in the results section under "descriptive analyses".

2.2 Procedures

2.2.1 Treatment.

The intervention group (IG) received support through the PAT program. With its current curriculum (Parents as Teachers National Center, 2011), PAT is designed to serve families from pregnancy to child age 3 years. The program can be universally applied and is especially suited for at-risk families. It includes home visit and group connection plans, information about child development for parents, suggested parent-child activities, and resource materials for home visitors. The overall PAT approach to working with families is grounded in human ecology theory and family systems theory. Accordingly, services are provided within the family context. In the current study the average number of home visits per month was 1.39 (SD = 0.29) for families who participated in the last measurement point. Group meetings were offered every month, with families participating on average every three months (M = 0.29, SD = 0.20). PAT focuses on interactions and relationships, and the services are adapted to the broader social, cultural, and societal contexts of the families. Participants in the control group (CG) did not receive support in child care and education through the PAT program but were referred to child-related institutions in the community if needed, e.g., if the well-being of the child was uncertain or if the researchers suspected developmental delay.

2.2.2 Randomization.

After enrollment, families were assigned to the IG and CG by stratified block randomization (Neuhauser et al., 2015). Stratification aspects were: (1) project site (three sites), (2) cumulative risk factors (high vs. low), (3) single parent (yes/no), and (4) German language skills (needs translation: yes/no). Randomization was successful regarding stratification and other crucial characteristics of the families; there was a significant difference between IG and CG only in 'child age at first measurement' (see Table 1). However, the number of girls was higher in the IG, there were slightly more mothers with no post-compulsory education in the CG, and multilingual children were slightly overrepresented in the IG. We controlled statistically for these differences in the data analyses.

2.2.3 Longitudinal data collection.

Data was collected at baseline (t_0) and around the child's first (t_1), second (t_2), and third (t_3) birthdays. Psychosocial stress and demographic characteristics were assessed only at baseline; maternal sensitivity was assessed at baseline and around the child's first birthday.

2.3 Measures

For data collection, families were visited by a member of the research team. If needed, researchers were accompanied by an intercultural interpreter.

2.3.1 Sociodemographic information.

Sociodemographic information was collected by means of a semi-structured interview. Variables collected included, among others, study site (dummy coded for three sites); child's sex (0 = male; 1 = female), low birth weight (< 2500g) (0 = no; 1 = yes), age at baseline measurement (in days), multilingualism (0 = monolingual; 1 = multilingual), firstborn (0 = no; 1 = yes), number of siblings; mother's age at the birth of the child (in years), percentage of lifetime (in years) residing in Switzerland before the birth (values of this continuous variable 'duration of residence' range from 0 [= less than a year] to 1 [= born in Switzerland]), and education. Mother's education was constructed as the mother's educational attainment and dichotomously coded as 'compulsory education' (0 = lack of education, special education, or completion of compulsory schooling through Grade 9) and 'post-compulsory education' (1 = vocational education, baccalaureate school, or university).

2.3.2 Stress constellation

Psychosocial stress and protective factors were assessed using the Heidelberg Stress Scale (*Heidelberger Belastungsskala*, HBS) (Sidor et al., 2012) at the baseline data collection. The HBS measures a family's psychosocial stress in the following areas: (1) stress mainly related to the child, (2) personal-familial stress, (3) social stress, and (4) material stress. In addition to stress factors, protective

factors can be included in the assessment. The values range from 0 (no stress) to 100 (very high stress); for the analyses in this study, the range of values was scaled to 0 to 10. In addition, a score for global psychosocial stress was estimated based on the four stress areas. The HBS assessment is based on semi-structured interviews on stress factors (e.g., employment situation, social contacts, course of pregnancy and birth, health, relationship, behavior of the child, traumatic experiences), as well as on observations during the researcher's visit to the family home (e.g., size and furnishing of the apartment, behavior of parent and child, appropriate environment). Three members of the research team individually assessed the stress constellations of the families that they visited. All three members coded a subsample of 30 randomly chosen case vignettes. The intraclass correlation (*ICC*) was .78 for child-related stress, .64 for familial stress, .74 for social stress, .84 for material stress, and .69 for global psychosocial stress.

2.3.3 Maternal sensitivity

The CARE-Index (Crittenden, 2010) is based on attachment theory and was designed to rate sensitivity of the adult in the context of the caregiver-child dyad. Sensitivity is operationalized as a multicriterion construct and defined as any behavior that increases a child's comfort and attentiveness or decreases discomfort and disengagement. Assessment is based on a 3 to 5-min play interaction, videotaped at the family's home at baseline (t_0) and again around the child's first birthday (t_1). Seven modalities of dyadic behavior are evaluated: facial expression, verbal expression, position and body contact, affection, turn-taking contingencies, control, and choice of activity. Scores are summed to generate seven scale scores. For adults, the scales are: sensitive, controlling, and unresponsive behavior; for the infant: cooperative, difficult, compulsive, and passive behavior. According to the research goals of this study, we refer solely to the sensitivity scale. The sensitivity score ranges from 0 to 14, with higher scores indicating a higher degree of sensitivity. For mothers with twins and therefore two sensitivity scores, it was randomly determined which of the scores would be used in the analyses. Three coders were trained and certified by the developer of the CARE-Index, with an *ICC* > .80 for each coder. Additionally, each coder scored a test set with 25 videos of the sample independently and blind to family background information (*ICC* = .82 at t_0 and *ICC* = .72 at t_1).

2.3.4 Language outcomes.

Language outcomes were examined with the Bayley Scales of Infant and Toddler Development Third Edition (Bayley-III) (Bayley, 2006) at t_1, t_2, and t_3. The language scale of the Bayley-III contains receptive and expressive language subtests to assess communication skills, including language and gestures. Normed scores have a mean of 10 and a standard deviation of 3, with higher scores indicating better development. The psychometric properties of the Bayley-III have been established in children with typical development (Reuner & Rosenkranz, 2014). Trained and experienced pediatricians administered the Bayley-III at a family center. In this study, we included only the assess-

ments at t_2 and t_3, because assessments at 12 months (t_1) have low predictive power for later language development (Suchodoletz, 2011).

2.4 Analysis strategy

Three sets of analyses were conducted to address the aims of the study. First, we investigated the associations between the outcome variables by simple bivariate correlations, and we analyzed attrition from baseline assessment to 36 months by comparing characteristics of the sample in IG and CG.

In the second set of analyses, we analyzed the hypothesized mechanisms underlying the PAT treatment using longitudinal mediation and one-tailed hypothesis tests. The variables were analyzed in autoregressive cross-lagged models, which are especially useful for identifying the relations between variables across time and also to elaborate on how the effects occur (Selig & Little, 2012). To investigate the effects of the early intervention on receptive and expressive language outcomes we focused on the total effects of the mediation analysis. We then analyzed: (1) simple mediations on receptive and expressive language outcomes at 24 months with maternal sensitivity at 12 months as a mediator, and (2) serial multiple mediations on receptive and expressive language outcomes at 36 months with the mediators maternal sensitivity at 12 months and receptive and expressive language outcomes at 24 months (see Figure 1). Mediations were tested by the bias-corrected asymmetric bootstrap confidence interval for the indirect effect (10'000 bootstrap samples). Because asymmetrical confidence intervals are expected for indirect effects, in the tables 4-6 standard errors for indirect effects are not reported (Hayes, 2013; Mallinckrodt, Abraham, Wei, & Russell, 2006).

In the third set of analyses, within a moderated mediation framework we investigated for whom the early intervention was the most effective. Following recommendations by Hayes (2013), we included in the moderated mediation path model an "intervention x psychosocial stress" interaction term as a predictor of maternal sensitivity and language outcomes in addition to the model in Figure 1. Each predictor was mean-centered to form the interaction term. The nature of the moderated relationship was examined by the post hoc region of significance test, which is an extension of the Johnson-Neyman technique (Breitborde, Srihari, Pollard, Addington, & Woods, 2010; Muthén & Asparouhov, 2014).

In addition to the study variables, we included the covariates child's sex, age at first measurement, firstborn, number of siblings, multilingualism; mother's education, duration of residence in Switzerland, and age at the child's birth, because previous studies showed that they were correlated with either maternal sensitivity and/or language development (Hoff, 2006; Neuhauser, 2016). Moreover, we also controlled for study sites.

We carried out path analysis using Mplus version 7 (Muthén & Muthén, 2012) to estimate the parameters simultaneously. Mplus allows estimation of bootstrapped standard errors and confidence

intervals for each model coefficient as well as handling of missing data with multiple imputation in order to reduce biased estimate results as far as missing at random (MAR) can be assumed (Enders, 2010)

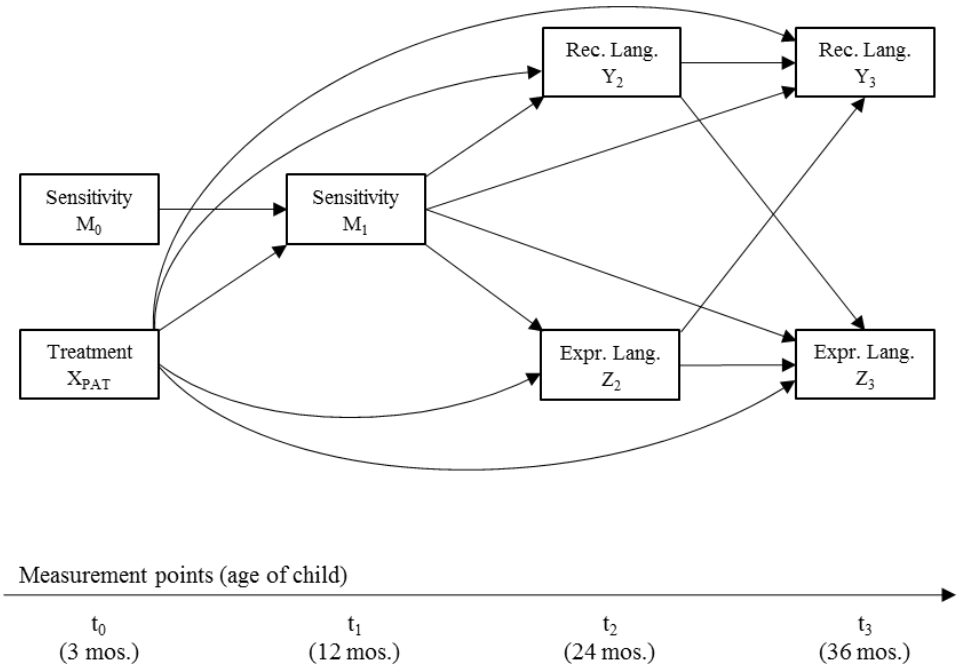

Figure 1. Longitudinal autoregressive mediation model with the direct and indirect paths of interest. Not shown are effects of covariates (including stress) on all dependent variables or correlations between language outcomes.

3. Results

3.1 Attrition analyses

Families that participated at baseline (N = 244) were compared to families that stayed in the study until the assessment at 36 months (N = 206) with respect to sociodemographic variables. The overall attrition was 16%. Attrition in IG was 18% and in CG 13%; differential attrition was thus 5%. According to the What Works Clearinghouse (WWC) attrition standard (Institute of Education Sciences, 2013), the level of expected bias about the relationship between attrition and outcomes is acceptable. The data in Table 1 show that with respect to sociodemographic characteristics, the IG and CG changed only very little from the baseline assessment and the assessment at t_3.

Table 1. Descriptive characteristics of the sample at baseline assessment and at age 3.

Baseline variable	Baseline assessment		Assessment at t_3	
	IG (n = 131)	CG (n = 113)	IG (n = 108)	CG (n = 98)
	M (SD) / %	M (SD) / %	M (SD) / %	M (SD) / %
Family characteristics				
Single parent	13%	15%	11%	14%
First child	57%	58%	54%	55%
Twins	5%	4%	4%	5%
Number of siblings	0.60 (0.81)	0.68 (0.95)	0.65 (0.86)	0.76 (0.99)
Stress (HBS)	4.78 (1.63)	4.57 (1.49)	4.75 (1.68)	4.56 (1.48)
ISEI	35.15 (15.36)	35.47 (14.92)	35.68 (16.34)	35.85 (15.40)
Children				
Female	57%	47%	55%	48%
Premature (< 37 weeks)	12%	10%	11%	10%
Low birth weight (< 2500g)	8%	10%	8%	10%
Age at first measurement	86.24 (43.16)	98.50 (50.61)*	85.00 (43.28)	100.00 (48.82)*
Multilingual	14%	7%	16%	7%
Mother				
Age at birth (years)	29 (5.90)	30 (5.54)	30 (5.80)	30 (5.67)
No post-comp. education	32%	38%	34%	42%
Duration of residence	0.37 (0.37)	0.40 (0.36)	0.39 (0.37)	0.37 (0.34)
Foreigners (nationality)	73%	75%	72%	77%
Low German proficiency	32%	30%	29%	32%

Note. IG = intervention group; CG = control group; HBS = Heidelberg Stress Scale; ISEI = International Socio-Economic Index of occupational status.
*p < .05, two tailed.

3.2 Descriptive analyses

The sociodemographic characteristics of the sample indicate that families with psychosocial stress and migration background were recruited: Table 1 shows that global stress exceeded the limit of 4.00 (out of a maximum 10 points); this means that on average, intervention is indicated (Sidor et al., 2012). The same is true for the sensitivity values, which average at 5.50 points (out of a maximum of 14 points) in the intervention range of the scale at baseline assessment (Crittenden, 2010). The sensitivity value improves during the first year of life, but remains in the intervention range at 6.69 (see Table 2). Moreover, 74% of mothers were non-Swiss, 35% of mothers had completed only compulsory or less education (23% finished compulsory schooling, 12% did not graduate), and 65% had post-compulsory education (35% vocational education, 14% baccalaureate school, 16% university).

Table 2 shows correlations within and across time. PAT intervention was significantly correlated only with maternal sensitivity at baseline measurement (t_0) and expressive language at 36 months. Further, psychosocial stress was significantly correlated with all other variables. There were significant positive correlations between maternal sensitivity at baseline measurement (t_0) and all language variables, but maternal sensitivity at 12 months (t_1) was significantly correlated with only receptive language. With regards to language development, the data shows that the mean values of the children average in the normative range (see Table 2). Missing data were not estimated in these preliminary analyses. Thus, the number of cases included ranged from N = 171 to N = 244.

Table 2. Means, standard deviations, and intercorrelations among study variables from t_0 to t_3.

	1.	2.	3.	4.	5.	6.	7.	8.
1. Intervention	-							
2. Psychosocial stress t_0	.07	-						
3. Sensitivity t_0	-.16*	-.25**	-					
4. Sensitivity t_1	.06	-.33**	.31**	-				
5. Receptive language t_2	.10	-.31**	.26**	.25**	-			
6. Receptive language t_3	.04	-.34**	.19*	.22**	.69**	-		
7. Expressive language t_2	.11	-.21**	.21**	.11	.66**	.49**	-	
8. Expressive language t_3	.15*	-.24**	.17*	.14	.58**	.72**	.59**	-
M	.54	4.68	5.50	6.69	7.36	9.28	8.28	7.48
SD	.50	1.57	1.71	2.17	3.37	2.97	3.86	2.40

*p < .05 **p < .01, two tailed.

3.3 Mediation analyses

Longitudinal mediation analyses were conducted to investigate the mechanisms underlying PAT treatment effects in families with psychosocial stress. Tables 3 to 5 show the simultaneously computed regression coefficients, standard errors (*SE*), and confidence intervals (CI) for maternal sensitivity and receptive and expressive language outcomes. The model fit the data well ($\chi^2(6) = 5.719$, $p = .455$; CFI = 1.000; TLI = 1.000; RMSEA = .000; SRMR = .010).

3.3.1 Stability.

The autoregressive effects describe stability over time, i.e., the degree to which individual differences in a variable are maintained from one occasion to the next (Selig & Little, 2012). The significance of the autoregressive effects indicated a certain degree of stability for maternal sensitivity, expressive language, and receptive language, but stability was considerable only for receptive language (see Tables 3-5).

Table 3. Mediation analysis: Direct and autoregressive effects on sensitivity.

Antecedent	Sensitivity (M_1)		
	Coeff.	*SE*	90% CI
Autoregressive effects			
Sensitivity (M_0)	0.27**	0.09	[0.13, 0.42]
Direct effects			
Treatment (X_{PAT})	0.58*	0.29	[0.12, 1.07]
Psychosocial Stress (X_{Str})	-0.37***	0.10	[-0.54, -0.21]
R^2	0.22***	0.05	

Note. CI = Confidence Interval. Adjusted for differences in child's sex, age at first measurement, firstborn, number of siblings; mother's education, duration of residence in Switzerland, age at birth; study site.
*p < .05 **p < .01 ***p < .001, one-tailed.

Table 4. Analysis of mediation by sensitivity: Effects on receptive language outcomes.

Antecedent	Receptive language (Y_2)			Receptive language (Y_3)		
	Coeff.	*SE*	90% CI	Coeff.	*SE*	90% CI
Autoregressive effects						
Receptive language (Y_2).				0.54***	0.08	[0.42, 0.67]
Direct effects						
Treatment (X_{PAT})	0.42	0.43	[-0.27, 1.12]	-0.23	0.34	[-0.79, 0.32]
Psychosocial Stress (X_{Str})	-0.33*	0.17	[-0.59, -0.06]	-0.24	0.15	[-0.48, 0.01]
Sensitivity (M_1)	0.21*	0.10	[0.05, 0.37]	0.02	0.09	[-0.13, 0.17]
Expressive language (Z_2)				0.01	0.06	[-0.10, 0.11]
Indirect effects						
$X_{PAT} \rightarrow M_1 \rightarrow Y_2^a/Y_3^a$	0.12*		[0.02, 0.32]	0.01		[-0.07, 0.13]
$X_{PAT} \rightarrow M_1 \rightarrow Y_2 \rightarrow Y_3^b$				0.07*		[0.01, 0.18]
$X_{PAT} \rightarrow M_1 \rightarrow Z_2 \rightarrow Y_3^b$				0.00		[-0.01, 0.02]
Total specific indirect effects						
$X_{PAT} \rightarrow M_1 \rightarrow Y_3^a$				0.08		[-0.00, 0.27]
Total effect						
Treatment (X_{PAT})	0.55	0.42	[-0.14, 1.24]	0.08	0.39	[-0.55, 0.72]
Psychosocial Stress (X_{Str})	-0.42**	0.16	[-0.68, -0.15]	-0.49***	0.15	[-0.73, -0.23]
R^2	0.25***	0.05		0.51***	0.06	

Note. CI = Confidence Interval. Adjusted for differences in child's sex, age at first measurement, firstborn, multilingualism, number of siblings; mother's education, duration of residence in Switzerland, age at birth; study site.
[a]Simple mediation; [b]serial multiple mediation.
*p < .05 ***p < .001, one-tailed.

Table 5. Analysis of mediation by sensitivity: Effects on expressive language outcomes.

Antecedent	Expressive language (Z_2)			Expressive language (Z_3)		
	Coeff.	*SE*	90% CI	Coeff.	*SE*	90% CI
Autoregressive effects						
Expressive language (Z_2)				0.23***	0.05	[0.14, 0.31]
Direct effects						
Treatment (X_{PAT})	0.62	0.52	[-0.21, 1.48]	0.32	0.28	[-0.15, 0.77]
Psychosocial Stress (X_{Str})	-0.41*	0.19	[-0.73, -0.10]	-0.08	0.11	[-0.27, 0.11]
Sensitivity (M_1)	0.12	0.13	[-0.08, 0.34]	-0.03	0.07	[-0.14, 0.07]
Receptive language (Y_2)				0.19**	0.07	[0.09, 0.31]
Indirect effects						
$X_{PAT} \rightarrow M_1 \rightarrow Z_2^a/Z_3^a$	0.07		[-0.02, 0.29]	-0.02		[-0.12, 0.03]
$X_{PAT} \rightarrow M_1 \rightarrow Z_2 \rightarrow Z_3^b$				0.02		[-0.00, 0.07]
$X_{PAT} \rightarrow M_1 \rightarrow Y_2 \rightarrow Z_3^b$				0.02*		[0.00, 0.08]
Total specific indirect effect						
$X_{PAT} \rightarrow M_1 \rightarrow Z_3^a$				0.02		[-0.05, 0.13]
Total effect						
Treatment (X_{PAT})	0.69	0.52	[-0.14, 1.57]	0.55*	0.32	[0.04, 1.08]
Psychosocial Stress (X_{Str})	-0.46**	0.19	[-0.78, -0.15]	-0.25*	0.12	[-0.45, -0.06]
R^2	0.18***	0.05		0.44***	0.05	

Note. CI = Confidence Interval. Adjusted for differences in child's sex, age at first measurement, firstborn, multilingualism, number of siblings; mother's education, duration of residence in Switzerland, age at birth; and study site.
[a]Simple mediation; [b]serial multiple mediation.
*p < .05 **p < .01 ***p < .001, one tailed.

3.3.2 Psychosocial stress and direct effects of the control variables on language outcomes.

With psychosocial stress, all total effects on the language outcomes were significant. The direct effects on maternal sensitivity at 12 months and language outcomes at 24 months were also significant (see Tables 3, 4, and 5). Regarding control variables (not shown in the tables), child's sex had a significant effect on receptive language (B = 1.02, SE = 0.42, 90% CI [0.33, 1.71], p < .01) and on expressive (B = 2.30, SE = 0.50, 90% CI [1.49, 3.12], p < .000) language outcomes at 24 months. In

the third year of life, only mother's proficiency in German had a significant effect on the development of expressive language from 24 to 36 months (B = 0.39, SE = 0.18, 90% CI [0.09, 0.67], $p < .05$). The analyses revealed no significant direct effects of any other control variables.

3.3.3 Treatment effects

Total effects represent the sum of direct and indirect effects, i.e., the effect of the independent variable, treatment, on the outcomes at 24 months and on the outcomes at 36 months. Positive treatment effects were found only on expressive language at 36 months. Children in the IG scored higher on expressive language than children in the CG by 0.55 points. Also, the direct effect on maternal sensitivity at 12 months was significant; mothers in the IG had a higher score on sensitivity by 0.58 points.

3.3.4 Simple mediation analysis

Simple mediation analyses in Table 4 show that maternal sensitivity mediated effects of the intervention on receptive language at 24 months. By strengthening maternal sensitivity, the intervention contributed to a higher score on receptive language by 0.12 points (Table 4). For expressive language (Table 5) we found no simple mediation effects of the intervention mediated through maternal sensitivity. In addition, the two total indirect effects on language outcomes at 36 months through the intervening variable maternal sensitivity were not significant.

3.3.5 Serial multiple mediation analysis

The serial multiple mediations yielded significant indirect effects, mediated by maternal sensitivity at 12 months and receptive language at 24 months, on receptive language at 36 months (Table 4) and on the development of expressive language from 24 to 36 months (Table 5). Accordingly, the cross-lagged effects show that the pathway (direct effect) from receptive language at 24 months to expressive language at 36 months was significant. In all, all predictors (also including language level at 24 months), inclusive of control variables, explained 51% of the variance in receptive language and 44% of the variance in expressive language at 36 months.

3.3.6 Moderation and moderated mediation analysis

The model with the additional interaction term *intervention x psychosocial stress* fit the data well ($\chi^2(7) = 7.465$, $p = .382$; CFI = .999; TLI = .988; RMSEA = .017; SRMR = .010), and for the direct and indirect effects the coefficients were similar overall to those found with the model without the interaction term. The *moderation analysis* showed that the direct effect of the interaction term on maternal sensitivity at 12 months and the total and direct effect on receptive language at 24 months were significant (see Table 6) – that is, the effect of the intervention was stronger, the higher the psychosocial stress. All other effects of the interaction term were not significant. The regions of

significance test indicates (see Table 6), for example, that the intervention (total effect) has a significant effect on language comprehension at 24 months at high values of psychosocial stress, starting slightly below the mean of the HBS scale at 4.52. With the *moderated mediation*, we claim that simple and serial multiple mediation function differently depending on the moderator psychosocial stress (Hayes, 2013). We found a moderating effect of psychosocial stress on the three significant indirect effects mentioned above and also examined their regions of significance (see Table 6).

Table 6. Significant effects of the interaction term PAT x stress with regions of significance (RoS) Values.

Path	Coeff.	*SE*	90% CI	RoS[a]
Moderation				
$X_{PAT*Stress} \rightarrow M_1$	0.30*	0.18	[0.01, 0.59]	4.53-10.00
$X_{PAT*Stress} \rightarrow Y_2$[b]	0.53*	0.29	[0.08, 1.01]	4.82-10.00
$X_{PAT*Stress} \rightarrow Y_2$[c]	0.58*	0.28	[0.15, 1.05]	4.52-10.00
Moderated Mediation				
$X_{PAT*Stress} \rightarrow M_1 \rightarrow Y_2$	0.05*		[0.00, 0.17]	5.88-10.00
$X_{PAT*Stress} \rightarrow M_1 \rightarrow Y_2 \rightarrow Y_3$	0.03*		[0.00, 0.10]	5.08-10.00
$X_{PAT*Stress} \rightarrow M_1 \rightarrow Y_2 \rightarrow Z_3$	0.01*		[0.00, 0.04]	4.68-10.00

Note. CI = Confidence Interval; RoS = Region of Significance; M_1 = Sensitivity at age 24 months; Y_2 = receptive language at 24 months; Y_3 = receptive language at 36 months; Z_3 = expressive language at 36 months. Adjusted for differences in child's sex, age at first measurement, firstborn, number of siblings; mother's education, duration of residence in Switzerland, age at the child's birth; and study site.
[a]RoS with respect to HBS scale and 95% CI; [b]direct effect; [c]total effect.
*$p < .05$, one-tailed.

4. Discussion

The aim of this study is to investigate the underlying mechanisms and differential effects of the PAT early intervention program in families at risk. Examination of the family psychosocial stress constellation showed that the intervention was indeed conducted with the intended target group. Also, the attrition bias over a period of three years can be assumed to be small. The results regarding the *total effects* showed that PAT has a small significant effect on expressive language in the third year of life. This reflects the research findings on the effectiveness of home visiting programs, that showed heterogeneous and overall small effects on cognitive and language outcomes (Filene et al., 2013; Mathematica Policy Research, 2016; Sweet & Appelbaum, 2004). Moreover, in accordance with previous research findings psychosocial stress was found to be an important predictor of language development (Belsky, 2014; Hoff, 2006). That is, psychosocial stress has a significant negative effect on all language outcomes. And finally, the early intervention with PAT was found to be a significant predictor of maternal sensitivity at age 12 months. In the following, we turn to whether effects of the early intervention are mediated by improvement in maternal sensitivity and whether psychosocial stress moderates the intervention effects.

4.1 Underlying mechanisms

In line with Bronfenbrenner's bioecological model (Bronfenbrenner & Morris, 2006), the analyses reveal that the early intervention program PAT influences language outcomes by enhancing maternal sensitivity. The significant mediational relationships are *indirect only* (Zhao, Lynch, & Chen, 2010), because in each case, the mediation but not the direct effect of the PAT program on language outcomes is significant. Nevertheless, the mediations are weak and via specific pathways. They are specific, because of all possible mediations examined, only *simple mediation* by maternal sensitivity on receptive language at 24 months and *serial multiple mediation* by maternal sensitivity at 12 months and receptive language at 24 months have significant effects on receptive and expressive language outcomes at 36 months. The mediation is weak, because the indirect effects are small, especially with the serial multiple mediation. Moreover, the total indirect effect mediated by maternal sensitivity on language outcomes at 36 months is non-significant and weak. Based on this, maternal sensitivity measured at the end of the first year of life is of some, but limited importance in explaining the mechanisms underlying PAT treatment effects on subsequent language outcomes.

To understand the small and specific indirect effects, we need to take a closer look at the interplay of the involved direct effects. Regarding the *intervention effect on maternal sensitivity*, PAT demonstrated a significant effect with a small difference of 0.13 standard deviations between IG and CG. This is smaller than the medium effect (d = 0.33) of randomized sensitivity interventions reported in the meta-analysis by Bakermans-Kranenburg et al. (2003). That is, the improvement in maternal sensitivity might have been too small to contribute substantively to the indirect effect. A possible explanation for the small effect could be the early assessment of maternal sensitivity at age one – two years before completion of the full PAT program. It therefore remains open whether there are longer-term effects on maternal sensitivity and how they are connected with subsequent language development. Additionally, the intended intensity of two home visits per month as recommended by the Parents as Teachers National Center (2011) was not achieved. This might have diminished potential effects of PAT on maternal sensitivity. However, effects of length and intensity are discussed controversially in early intervention research (Nievar et al., 2010).

Regarding the effects of *maternal sensitivity on language outcomes* at 24 and 36 months, only one small significant effect on language comprehension at 24 months was found. A possible explanation for the low association could be that the sensitivity construct used in this study emphasizes the affective attunement of mother and infant (Crittenden, 2005) rather than specific language-related dimensions of the mother-child interaction. For example, vocalizations of mother and child are only one of seven behavioral aspects for the assessment of maternal sensitivity with the CARE-Index (Crittenden, 2010). Therefore, on the CARE-Index an interaction can be assessed as sufficiently sensitive, even if there is little vocal stimulation. But sensitive vocal responses to child cues and supplying the infant with labels and names for objects is important especially for children in at-

risk families, as the children experience less language stimulation at home than children in better-off families (Hoff, 2006).

The small effects, especially on language outcomes at 36 months, raise methodological and developmental questions. Regarding *methodology*, the question is to what extent maternal sensitivity measured at the end of the first year of life is an accurate predictor of language outcomes at the end of the third year of life. Research findings indicate discontinuity in maternal sensitivity over time due to psychosocial stress and also associations between changes in maternal sensitivity and developmental outcomes (Belsky & Fearon, 2002; Hirsh-Pasek & Burchinal, 2006; Pianta et al., 1989). Against this background and according to the low to moderate stability in maternal sensitivity (Kemppinen, Kumpulainen, Raita-Hasu, Moilanen, & Ebeling, 2006) there is reason to assume that a temporally closer assessment of maternal sensitivity to language outcomes would be more accurate. Regarding *language development* it should be considered, whether older children require other and more specific forms of support than younger children. Research on parental supports for children's language development suggests that the developmental tasks of each period of language development are best supported by specific parental inputs. With increasing age, for example, parent-directed teaching efforts toward promoting children's cognitive and language development become more important for the child's productive vocabulary (Vallotton et al., 2017).

And finally, regarding the *underlying mechanism of language development*, the results reveal that receptive language at 24 months plays a key role for subsequent language outcomes. For one, it is affected by the simple mediation by sensitivity and for another, it has a significant effect on later language outcomes at 36 months. The finding that expressive language at 24 months has no significant effect on receptive language at 36 months is in line with the vocabulary learning pattern described frequently in the literature, according to which comprehension of words precedes and influences production of the words (Clark, 1993). However, since most studies up to now have investigated the acquisition of language in comprehension and in production independently, little is known about their interplay, and further research is needed (Gershkoff-Stowe & Hahn, 2013).

4.2 Differential effects

The underlying mechanisms investigated show that maternal sensitivity contributes towards explaining the intervention effects of PAT through specific pathways but that the indirect effects are small. This raises the question as to whether there are subgroups that benefit especially from early intervention. The effects found in this study are in the sum slightly stronger for families with higher psychosocial stress. This can be seen, for one, in the moderation of the treatment effect on maternal sensitivity at 12 months, the moderation of the total and direct effect on receptive language at 24 months and, for another, in the moderation of the significant simple and serial multiple mediations. Taken together, PAT was effective on language comprehension up to the end of the second year of life,

when the medium psychosocial stress level was in the intervention range (Sidor et al., 2012). During the third year of life, there is a significant effect of PAT on expressive language independent from psychosocial stress. Both effects are to a certain extent explained by a mediation through maternal sensitivity, respectively through maternal sensitivity and receptive language, with children in psychosocially stressed families benefitting the most. These results are in line with previous research findings, indicating similar or better progress for at-risk subgroups (Bakermans-Kranenburg et al., 2003; Kitzman et al., 2010; Letourneau et al., 2015; Olds et al., 2014; Wagner et al., 1999). However, there is further research needed to answer the question whether and under what conditions PAT is most effective. Thereby additional potential moderators should be considered, such as features of structural and process quality.

5. Limitations and strengths

The ZEPPELIN study had a number of strengths, including rigorous research design, longitudinal data collection, and low attrition. We note also the following limitations: First, random assignment can ensure that treatment bears no systematic bias and its (total) effects on all dependent variables can be interpreted causally. However, it does not rule out that dependent variables may be influenced by some omitted variables. If this affects the relationship between a dependent variable and its mediator, the separation between direct and indirect effects would be invalid (Bullock, Green, & Ha, 2010). Second, the analyses were carried out on the basis of manifest measured constructs. Therefore, the analyses do not consider measurement error, and the estimation of total, direct, and indirect effects may be distorted (Muthén, Muthén, & Asparouhov, 2016). Third, in view of the intercultural composition of the sample, the examinations were conducted in different languages and in part with the aid of intercultural interpreters. We controlled for the mothers' proficiency in German in the analyses, but we cannot exclude the possibility that the language heterogeneity led to additional error variance. At the same time, however, we see the intercultural make-up of the sample and the demonstrated psychosocial risk of the families as unique strengths of the ZEPPELIN study (Neuhauser et al., 2015).

6. Implications for practice

The present study provides further pieces of the puzzle regarding effective support of families with psychosocial stress. Understanding of causal mechanism of home visiting models is important for program design and modification (Reynolds & Ou, 2015). The results of this study indicate, that both early intervention with PAT and psychosocial stress had effects on maternal sensitivity and language development. Thus, interventions to promote parental sensitivity and reduce family stress

should be combined. Considering the small indirect effects on language development, additional mechanism, for example through specific early literacy environment (Rodriguez et al., 2009) or cognitive stimulation (Vallotton et al., 2017), may also be important. Regarding differential effects, results of the present study indicate that the psychosocial stress level of the family moderates intervention effects. Therefore, the target group of early interventions should be precisely defined, specifically recruited, and specifically supported.

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1999-2008	Studium der Pädagogik, Entwicklungspsychologie und Psychopathologie des Kindes- und Jugendalters an der Universität Zürich mit Auslandsemester in Spanien (Universidad de Las Palmas de Gran Canaria).
1990-1996	LehrerInnenseminar Rorschach
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